DS18B20 j m k k d h _ h i b k Z g b _ j Z [ h l u k ^ Z l q b d h f l _

MEGETEX

Q _ j g h \ = _ g g Z ^ b

J _ d h f _ g ^ m x  i j h q b l Z l v  i h e g h k l v x

## Описание.

DS18B20 pbnjh\hc l_jfhf_ljijk]jZffbjm_fuj Zaj_r_gb_ hl 9 ^h 12–bit, dhlhjh_fh`_l khojZgvky EEPROM iZfylbijb[hjZ DS18B20 h[f_gb\Z_lky ^Zggu 1-Wire ihbg_b ijb wlhf fh`_l [ulv dZd _^bgkl_gguf mkljhckl\hf gZ ebgbb lZd kj_Zjhl_ kk\u]jmZir_bg_ mijZ\eyx p_gljZevguf fbdjhijhp_kkhjhf

>bZiZahg baf_j_g 55°C h +125°C b lhqghkl 0.5°C \ ^bZiZahg –10°C ^h +85°C. < ^hiheg_gb_ DS18B20 fh`_l iblZlvky gZijy`_gb_f ebgb (parasite power), ijb hlkmlkl\bb \g_rg_]h bklhq gZijy`_gby

DZ`^uc '6 % bf__l mgbdZevguc dh^ dhlhjuc ihke_^h\Zl_evguc dh^ dhlhjuc ihke_^h\Zl_evguc dh^ fgh`_kl\hf ^Zlqbdh\ '6 % mklZgh\e_gguo gZ h^ghc rbg_ LZdhceijbgZlivih^bhg fbdjhijhp_kkhj qlh[u dhgljhelgh_ kl\ ^Zlqbdh\ '6 % jZkij_^_eogbu [hevrhfm mqZkldmbeh`_gbydhlhju_ fh]ml ba\e_qv \u]h^m bgahkwlhc\dhkxqZgl kbdkhgfuhey l_fi_jZlmju \ a^Zgbyl[bjm^\Zgbb beb fZrbgZo Z lZd `_ dhgljhelv_fb_jZiljmZ\eu_gbb_ ijhp_kkZfb

**Назначение выводов Таблице 1**

| SO* | SOP* | TO-92 | K B F < H E | H I B K : G B ? |
|---|---|---|---|---|
| 5 | 4 | 1 | GND | H[sbc |
| 4 | 1 | 2 | DQ | <u\h^^Zggu\bh^Z \u\h^mZut/Output pin). Open-drain 1-Wire interface pin. Ih wlhc ebgbb ih^Z_lky iblZgb_ \ j_`b jZ[hlu k iZjZablguf iblZgb_f |
| 3 | 8 | 3 | VDD | VDD <u\h^iblZgbb. ***Для режима работы с паразитным питание VDD необходимо соединить с общим проводом.*** |

*<k_ hklZevgu_ \u\h^u ^he`gu hklZ\Zlvky g_ ih^dexq_ggufb

## Краткий обзор.

Beexkljpby ihdZau\-Zkol_fmhd '6 % b hibkZgby ^Zu\hky \ LZ[eb-pb_lh\uc 520 aZihfbgZ_l mgbdZevguc dh^ ijbi[hjZ b\gZy iZfylv kh^_jZblh\-uc l_fi_jZlmjguc j_]bklj dhgnb]mjZpbb ihagbZgbby ^Zu\hky l_fi_jZlmju ih hdhgqZgbx l_fi_jZlmjguc j_]bklj dhgnb]mjZpbb l_fi_jZlmjguc j_jghc ko_fhub TL bd j_]bkhj dhgnb]mjZpbb J_]bklj dhgnb]mjZpbb iha\hey_l ihevah\Zl_ey jZaj_rZxsmx kihkh[gbkl\h ij_h[jZah\Zl_ey l_fi_jZlmju d wlhebb \ebyl_Zf gZ \j_fy dhg_jlbjh\Zgby l_fi_jZlmju j_]bklju dhgnb]mjZpbb wg_j]hey_l EEPROM, lZdbf h[jZahf hgb khojZgyl ^Zggu_-\dbe^xq_jb[hj

'6 % bkihevam_l bkdexq-Wire ijb hhdh-eijb wlhf hjfbjm_kykh_^bg_gdbhlhjh_ hkms_kl\ey_l dhffmgbdZevguc bkihevah\ky]h^bg mijZ\eyxsbc kb]gZe ^he`gZ [ulv ih^dexqgZ d bklhqgbdm iblZgby q_j_a ih^ly]b\Zxsbc j_abklhj <ukhdbc kb]gZe rbgu aZjy`Z_l \ bkihevamxl kh_^bg_jgZ khklhygby beb \oh^ hldjulh]h klhdZ Bkihevamy wlm rb (mkljhckl\h mijZ\eb_gby lbnbpbjm_l b h[jZsZ_lZky ld f^ZjZ bmju bkihevah\ky ijb[hjZ lhkdhevdm dZ`^uc ijb[hj bf__l mgbdZevguc dh^ qbkeh ijb[hjh\ d dhlh h^ghc rbg_ nZdlbq_kdb g_h]jZgbq_ggh.

>jm]Zy hkh[_gghklv '6 % hkh[ghklv jZ[hlZlv [_a \g_rg_]h ihZgbyghklvZ ij_^hklZ\ey_lky q_j_a ih^ly]b\Zxsbc j_abklhj <ukhdbc kb]gZe rbgu aZjy`Z_l \ (CPP dhlhjuc iblZ_l ijb[hj dh]^Z gZ rbg_ gbadbc mjh_gv Wlhl f_lh^ ghkbl iblZgb_ª ljb wlhf fZdkbfZevgZy baf_jZ_l mZkhklZ\ey_l 100 °C. >ey jZkrbj_gby ^bZiZahgZ l_fi_jZlmj ^hg_h[ohC bfh bkihevah\Zlv \g_rg__ iblZgb_

**Рисунок 1**

## J_`b+ dhg_jlZpbb l_fi_jZlmju

Hkgh\gu_ nmgdpbhgZevgu_ \hafh`ghk-lb _]'6 %_fi_jZlmjguc ij_h[jZah\Zl_ JZaj_rZxsZy kihkh[ghklv l_fi_jZlmjgh]h ij_h[jZah\Zl_ey fh`_l [ulv baf_g_gZ khklZ\ey_l beb [blh\ khhl_lkl\my ijbjZs_gbyf ^blk dij_jZhnkjb baf_j °C, 0.25°C, 0.125°C b C° khhl_lkl_ggh JZaj_rZxsZy kihkh[ghklv ih mfheqZgbx [bl < bkoh^ghf khklhygbb '6 % gZoh^bilkyhy\ kh_kZlylgbhf khklhQylu b gZqZlv l_fi_jZlmjgh_ baf_j_ijb_h[jZah\gb_ _^msbc ^ihe^Zlgy dhfZg^m gZqZeZ dhg_jlbj l_fi_jZlmj[uo @ lhkdh_g_jlbjh\Zgbyemgu_ ^Zggu_ aZihfb\gZ[kZlkyh\hf_]bklj_ l_fi_jZlmju hi_jZlb\ghc iZfylb b '6 % \ha\jZsZ_lky d g_Zdlb\ghfm khklhygl \dexqg_k \g_rgbifblZgb_f_^msbfb`_l dhgljhebjh\Zlv dhg\_jlbjh\Zgb_ l_fi_jZlmj dhfZg^u > o @ ih khklhygbb '6 **DS18B20 будет формировать (ответ на слот времени чтения от устройства управления) логический «0» когда происходит температурное преобразование. И логическую «1», когда конвертирование выполнено.** ?keb '6 % \dexqjZ_jZ kblguf iblZgbwlZ l_ogheh]by m\_^hfe_gby [ulvfhk`ihleavh\ZgZ lZd dZd rbgim^Zlmv`ubkhdbc mjh\_g gZijy`_gb_ iblZglbyq_gb_ \kj_]fh_gb fi_jZlmjghi]h[jZah\Zgbywlhf kemqZ_ mkljhck mijZ\e_gby ^he`gh kZfhklhyl_evgh dhgljhebjh\Zlv \j_fy dhg\_jlbjh\Zgby <uoh^gu_ l_fi_jZlmjgu_ ^Zggu_ '6 % dZjeZh^mk\ZZguP_evk_fy_jZlmjgu_ ^Zggu aZihfbgZxlkZd [blh\h_gbkeh khdhafgZf jbk ;blu ijbagZdZ 6 mdZau\Zxl y\ey l_fi_jZlmjZeh`bl_evgZy beb hljbpZ^eyhvghZ`bl_evgZy Su=0, Z^eyhljbpZl_evgubk Se= 1. ?keb '6 % [m^_l gZ^kelydh_g\_jlbjh\Zgbyl_fi_jZlmjg j_]bklj_ [m^ml kh^_j`Zlv ^_ckl\bl_evgu_ ^Zggu_ aZj_ryZxs_c kihkh[ghklb [bl g_hij_^_e_g >ebylgh-qZaj_rZxs_c kihkh[ghklb [blg_hijb_^_e_ggub ^ebylghc jZaj_rZxs_c kihkh[ghklbg_hijb_^_e_ggu

LZ[ebpZ^Z_l ijbf_ju ^Zgguo pbnjh\h]h \uoh^Z b khhl_lkl\mxs_c l_fi_jZlmju jZaj_rZxs_c kihkh[ghklb

## Формат регистра температуры j b k2

TEMPERATURE/DATA RELATIONSHIP L Z [ e b p 2 Z

| L _ fi _ j Z l m j Z | P b n j h \ h \ u o h ^ ( ^ \ h b q g) u c | P b n j h \ h \ u o h ^ (Hex) |
|---|---|---|
| +125°C | 0000 0111 1101 0000 | 07D0h |
| +85°C* | 0000 0101 0101 0000 | 0550h |
| +25.0625°C | 0000 0001 1001 0001 | 0191h |
| +10.125°C | 0000 0000 1010 0010 | 00A2h |
| +0.5°C | 0000 0000 0000 1000 | 0008h |
| 0°C | 0000 0000 0000 0000 | 0000h |
| -0.5°C | 1111 1111 1111 1000 | FFF8h |
| -10.125°C | 1111 1111 0101 1110 | FF5Eh |
| -25.0625°C | 1111 1110 0110 1111 | FE6Fh |
| -55°C | 1111 1100 1001 0000 | FC90h |

*ijb ih^Zq_ iblZgby \ l_fi_jZlmjguc j_]bklj a85°C kZgh qbkeh

## Операция — передача сигналов аварии

lhke_ lh]h dZd '6\u% hegbl l_fi_jZlmjgh_ ij_h[jZah\Zgb_ l_fi_jZlmjgh_ ag
kjZ\gb\Z_ kh agZq_gb a_Z ibkZggu f \ j_]bklju 7/ hij_^_e_ggu_ ihevakh\jZbk3e_f
;bl ijbagZdZ 6 mdZhaeu\Zb_l_evgbe bhljbpZl_evgh_ agZq_gb_ ^ey iheh`SL_evgu
b ^ey hljbpZl_evgbk eh Z 6 J_]bkljZ 7+ b 7/ wg_j]hg_aZ\bkbfu ((35h2[ZahZdbf
khojZgy Zggu_h]^Zmkljhckl h[_klhq_gh D 7+ b 7/ fh`gh h[jZlblvky q_kjh_e Zgh
dZjl_ iZfydZd h[tykg_jZha^_e_ l:FYLB wlhcnkbidZpbb

## Формат регистров TH и TL j b k

>ey kjZ\g_gby bkihevamxlky 4-11 eh ah j_]bklj Z l_fi_jZlmju p_eh_ agZq_gb_ l_fi
?keb baf_j_gby Zy jZlmjZ gb è_b jZ\gZ 7/ beb \ur_ bTH, nj Z\gbZm_lmykeh\b\Zjb,b
b mklZgZ\eb\Z_lky :\Zjb \ '6 % Wlhl neZ] h[gh\ey_lky ihke_ dZ`^h]h l_
ij_h[jZah\Zgbiyh wlhfm mkkebh\b_ :\Zjbb ijhiZ^l_hl ] [mme^ Zk[jhr_gihke_ ke_^mxs_]h
l_fi_jZlmjgh]h ij_h[jZah\Zgby
=eZ\gh_ mkljhckl\h fh`_l imk\e_hjbb \Zjbb \k6o % gZ rbgh^Z\Zy dhfZ lh^bmkd
:\Zjb [ECh] Ex[hc '6 %k mklZgh\e_gguf ne\Z]jbfh_lbl gvZlmdhfZg^m lZdbf h[jZal
]eZ\gh_ mkljhckl\h fh`_lhij_^_ebl dZdb_ '6 Z %h^ylky \ khklhygbb? keZ bjabf b_g_gu
agZq_gb_ j_]bklj b 7+ b 7/ g_h[oh^bfh aZ imk\lb l_fi_jZlmjgh_ ij_h[jZah\Zgb_ q
\uihegbehikv_jdZ mkeh\bc dhgljhey l_fi_jZlmju aZ^Zggh_ \ j_]bkljZo 7+ beb 7

**Питание DS18B20**

'6 % fh`_l [ulv \dekq\gg_rgbf iblZgb VDD f bebhgfh`_l jZ[hlZlv \ j_«bZ jZablgh]h iblZgb by dhlhjmh_a\hey_l '6 % nmgdpbhgbjmb\Zlvby_gZ \uVDD _lZjZablgh_ iblZgb_ hq_gv ihe_^egyh ijbeh`_gbc dhlhju_ lj_[mxl hl^Ze_ggh]h l_fi_jZlmjgh]h kqbl h]jZgbq_gb_ k\ylaZkgbZjufb ebgbdyffbmgbdZj^b m`_ ijheh`_gh lhevdh ^\Zbk4\h^Z. ihdZau\Z_l kmo_ifh^dexq_gby '6 % iZjZablguf iblZgb hf \j_fy dhg\_jlbjh\Zgby nhjfbjh\Zgby bfimevkh\ \ukhdhqhj_majhlgZ gabklhj gZ rbgm ^Zgguo ihVZu_ lWylhiblZ gZijy`_gb_ khojZgy Zlky dhg^_gkZilZj Zablgh]h iblZgby qlh[u h[_ki_qblv iblZg mkljhckl\dZh]^Z gZ rbg_ ^Zgguo gbadQlh[mjh'6 %v bkihevah\jZ\bf_jZjZablgh]h iblZgby u\h^VDD ^he`_g [uihv^dexq_gu\dh^m GND.

< j_`bf_ iZjZablgh]h iblZgby: LUH-gZb -&33 ^he`gu h[_ki_qblv ^hklZlhqguc lh nmgdpbc '6 %j_[h\Zgby gZijy`_gb_ khxihklhygghfm kfhdmbl_jZa^_eW E?DLJBQ?KDB? O:J:DL?JBKLBDB

Dh]^Z '6 % \uihegy_l l_fi_jZlmjgu_ ij_h[jZah\Zgby m_beb^Zgg H_AMk \Zfylv EEPROM, fh`_l ihlj_[eylv lhd PIS Wlhl lhd fh`_l \ga^Zlvmklbfh_ kgb`_gb_ gZ rbg_ iblZ_fh]h qj_ja_bakhlj Qlh[u ]ZjZglbjmh\Zlv '6 % bf__l ^hklZlhqguc lhd ib g_h[oh^bfh h[_ki_\ukhdhlhqg iblZgb gZ rbg_dZ`^uc jZadh]^Z^_l l_fi_jZlmjgu_ ij_h[jZah\Zgbe_b\uihegy_lky_jZpby aZi^Zkbgu \((3520 Wlh fh`_l [ulv ^hklb]gmlh bkihevah\Zgbb 026)(7 ljZgabklhjZlh[u aZiblZlvgr_bgkj_^kl_vgmhdZd wlhdZaZgZh jb4k

Rbgl 1-Wire ^he`gZ [ulv i_j_dexq_gu\dh^m lhdfZg^u dhg\_jlbjh\Zgby l_fi_jZlmju &RQYHUW 7 > K@ beb dhfZg^u &RS\ 6 ^Zgguo \ ((3520 RbgZ ^he`gZ [ulv dexq_gZu\dhdhlhqgb_ gZ \jj_fy[jZah\Zgby WFRQY beb i_j_^Zqb ^ZgguoGbWZUb_ hiPjVZpbb gZ rbg_ g_ ^he`gu \uihegy \dexq_g \ukhdhlhqguc SXOOXS

'6 % fh`_l lZd`_ [ulv aZiblZg h[uqgukfhf_^lhg^_hgfbg_rg_]h we_dljhibdZgby^m 9'' dZd ihdZaZgh \ jbk lj_bfms_kl\h wlh]h f_lh^Z khklhbl \ lhf qlh bkihevah\Zgbb 026)(7 ljZgabklhjZ : gZ rbg_ fh]ml i_j_^Z\Zlvky ^Zggu_ l_fi_jZlmjghj_hh[jZah\Zgby

Bkihevah\Zgb_ iZjZablgh]h iblZgby g^m_lky ^ey l_fi_jZlmj k\ur_ & lZd fh`_l g_ [ulv \ khklhuyhebylvhg\_jlbjh\Zgb_ l_fi_jZlmjuav aZa[he__ \ukhdh]h lh ml_qdb dhlhjuc fh`_l [ulv ijb \ukhdhc l_fi_jZlmj_ >ey ijbeh`_gbc ^ey dhlhj y\eyxlky _jhylgufb gZklhjylhfvgh^m_qky [u '6 % eaZiblZg \g_rgbf iblZgb_f

< g_dhlhjuo kbl,mfZhp_bly o\hagbdgmlv g_h[oh^bifjhk^lve_gbb khklhygby j_`bfZ ib dhlhjh_ bkihevam_l ^Zlqbd l_^fejZlmjuo h^bfhkebvahkiZgby mijZ\e_gby iblZgb_f \g ljZgabklhjhf ^ey \uihegy_gby l_fi_jZlmjguo ij_h[jZah\Zgbc >ey ihemq fbdjhijhp_kkhj ^he`_g \u^Zgl^u dhNLS [C20] (Ijhimkb ROM) khijh\h`^Z_fZy dhfZg^h Ql_gb_ We_dljhibdZgby (Read Power Supply) [B4h] khijh\h`^Z_fhc ³kehlhf \j_f_gbk qlqgbyb´_ ql_gbkvehlZ \j_f_gb '6 % iZjZablguf iblZgb ***устанавит шину в ноль***, Z '6 % V k \g_rgbf iblZgb_f hkuZ ***шину в состоянии единицы***.

**Подключение DS18B20 в режиме паразитного питания рис 4.**

VPU

**Подключение DS18B20 в режиме внешнего питания рис 5.**

## 64-BIT код датчика

DZ`^uc '6 % kh^_j`bl mgbdZ[blg\uc d-h^ jbkk khojZg_gguc \ 520 FeZ^rb
[blh\ dh^Z 520 kh^_j`Zl dh^ k-Wire cikh\Zh^hf '6 % 2 V. Ke_^mxsb_ [blh\ kh^_j`
mgbdZevguc k_jbcguc ghf_j KlZjrb_ [blh\ kh^_j`Zl pbdebq_kdbc CRC dhgjhev b
dhlhjuc \uqbke_g hl i_j\uo [blh\ dh^Z 520 >_lZebabjh\Zggh_ h[tykg_gb
dhgljhey ba[ulhqghklb h[_ki_jZ\ 64 GENERATION pbdebq_kdh]h dhgljhey ba[ulhqgh
[blh\uc dh^ 520 b k\yaZggZy nmgdpby 520 mijZ\eyxl eh]bdhc iha\h 1-Wire '6 %
mkljhckl\h bkihevamy ijhlhdhe ^_lZebabjh 1-WIRE BUS SYSTEM wlhc lZ[ebpu ^Zgguo

64-BIT LASERED ROM CODE jb k6

## ПАМЯТЬ

lZfylv '6 % ¶V hj]Zgbah\ZgZ dZdjbkdZ\ZZyh khklhbl ba hi_jZ\ SRAM gZfylb b
wg_j]hg_aZ\bkbfhc EEPROM l_j\u_ ^\Z j_]bkljZ wlh j_]bklju dhg_jlhjZ l_fi_jZl
b^mjl_]bklju :\Zjb_bjog_]h b gb`g_]h iTH_ and TL b j_]bklj dhgnb]mjZpbb H[jZlbl_ \g
qlh _keb nmg\Zjbly 6 % g_ bkihevamh_jl_k]b kl TH and TL fh]mlyq_cdZmbb _jkZevghc
iZfylb <k_ dhfZg^u iZfylb hibkZgu ih^jh[gh FUNCTION COMMANDS DS18B20.
;Zcl b [ZclHAM kh^_j`bl feZ^mbbkl Zjrb[bl l_fi_jZlmjgh]h j_]bkljZ khhl_lkl_g
[Zclu lhevdh ^ey ql_gby ;Zclu b h[_kij_]b\kZ\ZZ TH and TL dZcl kh^_j`bl ^Zggu
j_]bkljZ dhgnb]mjZpbb dhlhju_ h[tykgyxlky ih^jh[gh \ jZa^_e_ J?=BKLJ
(CONFIGURATION REGISTER) wlhc lZ[ebpu ^Zgguo ;Zclu b aZj_a_j\bjh\Zgu ^
bkihevah\Zgby mkljhckl\hf\ bwlbZjb_]b kl ju g_\hafh`gZ ijb ql_gbb wlb [Zclu \ha
\k_o jZajy^Zo
8 ;Zcl HAM lhevdh ^ey ql_gby b kh^_j`Zl pbdebq_kdbc (CRC) dhgjhev ba[ulhqgh
^ey [Zclh\- 7 HAM '6 % ]_g_jbjm_l pbdebq_kdbc dhgljhev ba[ulhqghklb
hibkZgguc \ jZa^_gejZpbydebq_kdh]h dhgljhey ba[ulhqghklb
>ey aZibkb ^Zgguo \ [Zclu HAM bkihevamy Write Scratchpad [4Eh] ^Zggu_ ^he`gu
[ulv i_j_^Zgu dB20, gZqbgZy k [ZclZ Qlh[ udhj_jbl_ jbl_ hklv aZibkb g^Zggu^bfh
\uihegblv ql_gbb bkihevamy dhfZg^m Read Scratchpad [BEh] ihke_ lh]h dZd [^Zggu_
aZibkZgHu[jZlbl_ \gbfZgb_ qlh ijb ql_g'6b % ZggguZqbgZ_l i_j_^Z\ZZ k Qlh[u
khojZgbTH, TL b ^Zggu j_]bkljZ dhgnb]mjZpbb EEPROM, mkljhckl\h mijZ\e_gb_\ ^Zl`gh
dhfZg^u Copy Scratchpad [48h].
>Zggu khojZg_ggu_ \ j_]bkljZ EEPROM ijb \dexq_gbb ibl_jZ_ aZ]jm`Zxlky \ HAM 2
>Zggu_ fh]ml [ulv i_j_aZ]jeEPROM b\aHAM \ ex[h_ \j_fy dhfZg^u Recall E2 [B8h].
2
Mkljhckl\h mijZ\e_gby fh`_l dhgljhebjh\Zevalh E2 [B8h] @x ijhp_kk \uah\Z ^Zggu
EEPROM \ HAM im lk_bfgojh\b f^ZeivkZe_ dhfZg^u b dhgljhey khdkuh_ykeby
hi_jZpby i_j_aZ]jm^ade`Z_lk_ykeb ijhp_kk \uiheg_g

**DS18B20 карта памяти рис.7**

Khklhygb_ ihke_ \dexq_gby iblZgby aZ\bkbl hl agZq_gbc khojZg_ggh]h

**Регистр конфигурации**

;Zcl iZfylb kh^_j`bl j_]bklj dhgnb]mjZpbb dh,hdjZd bje]Zxkdjah\hZgZ jhb8.
lhevah\Zl_ev fh`_jhbZvkldhg_jkbhggmx jZaj_rZxsmx kihkh[ghklv '6[b%u5 bkihe
5 \ wlhf j_]bklZd ihdZaZgh \ LZ[ebp_ AgZq_gb_ ih mfheqZgbx \dexq_gby ib
b 5 [b-h\Zy jZaj_rZxsZy kihkh[ghklv H[jZlbl_ \gbfZgb_ aZ\bkb_fklvijy
f_`^m jZaj_rZxs_c kihkh[ghklvx b dhg_jkbhgguf \j_f_g_f ;bl b [blu hl
dhgnb]mjZpbb aZj_a_ujh\ZgmlZ_ml j_gg_]h bkihevah\Zgby mkljhckl\hfbafgg_ldml [
bkihevah\Zgby ihevah\Zl_e_f ijb ql_gbb\hvabjZ_bZxl © ª

**Регистр конфигурации** jbk8

DHGNB=MJ:PBY J:AJ?R:XS?C KIHKH;GHKLB LZ[ebpZ

| R1 | R0 | JZaj_r_gb_ | FZdkbfZevgh_ \j dhg_jlbjh\Zgb | |
|---|---|---|---|---|
| 0 | 0 | 9-bit | 93.75 ms | (tCONV/8) |
| 0 | 1 | 10-bit | 187.5 ms | (tCONV/4) |
| 1 | 0 | 11-bit | 375 ms | (tCONV/2) |
| 1 | 1 | 12-bit | 750 ms | (tCONV) |

## KBKL?F: RBGU K IJH<H>HF

Kbkl_fZ rbgu 1-Wire bkihevam_lky dZd ih^qbg_ggh_ mkljhckl\h mijZ\eylv h^gbf b
[he__ ih^qbg_ggufb mkljhckl\Zfbk_]6 % bkihevam_lky dZd ih^qbg_ggh_ mkljhckl\h
lhevdh h^gh ih^qbg_ggh_ gZ mkljhckl\h kbkl_fZ mihfbgZ_lky dZd _^bgkl\bkl_fZ kgb
kbkl_fZ fmevlbkgb`_gb_gZ_kbeb_ ijbkmlkl\mxl g_kdhevdh ih^qbg_gguo mkljhckl\
<k_ ^Zggu_ b dhifZg^Zxlky feZ^rbf [blhf \.iKe_^mxs_hlbkZgb_rbgu 1-Wire
jZa^_e_ghljbZ l_fu ZiiZjZlgu_ kj_b^kdhZnb]mjZpby hi_jZpbhggZy ihke_^h\Zl_
khh[sZxsbc ijh\h^ khh[sZxl h lbiZo b jZkkqblu\Zxsbc

## DHGNB=MJ:PBY :II:J:LGUO KJ?>KL<

Rbgl 1-Wire ijh\h^hf bf__l ih hij_^_e_gbx lhevdh _^bgkl_ggmx ebgbx ^Zgguo
mijZ\eyxs__ beb ih^qbg_ggh_ bkihevamxl bgl_jn_cku d rbg_ ^Zgguo q_j_a
dhee_dlhjhf beb lijhjflyk khklhygbyfb Wlh iha\hey_l dZ`^hfmimmkdjZhlvklmbghlx ^Zggu
dh]^Z mkljhckl\h g_ i_j_^Z_l ^Zggu_ lZdbf h[jZahf rbgZ ^hklmigZ ^ey
mkljhckl\hf 1-Wire ijh\h^hf '6 % kihkh[guc d ]em[hdhc \ulyf dj_ul\Zu\hml_qdZ
\gmlj_gg_c ko_fhc wd\b\Ze_glghdZ du\lZ\xhf\mjbk
Rbgl 1-Wire ijh\h^hf lj_[m_l \g_rg_]h ih^ly]b\Zxs_]h j_abklhjZ ijb[ebZdbf evg
h[jZahf g_Zdlb\gh_ khklhygbyfb 1-Wire rb^geuy eh]bq_kdZy _^bgbpZ ?keb mi^v dZ`dhbcg_ h[f_g
^Zggufb ^he`_g [ulv ijbhklZgh\e_g Hrhdkmh\GbMv@\Gg_Zdlb\ghf kkhklyZgb\e_gby
iblZgby ijhbkoh^bmfi_j_^Zgb_h\dh]^Z rbgZ gZoh^\bulkhydhf khklhygbb ?keb rbgZ
i_j__^_gZ \ gbadh_ khk\ljhyfgb[heg_f fdkh\k_ dhfihg_glu gZ rbg_ [m^ml k[j
bgbpbZabjh\Zgu

### Конфигурация шины jbk

VPU

### Последовательность операций

Ihke_^h\Zl_evghklv hi_jZpbc ^ey h[jZs_gby d '6 %

**Шаг 1.** BgbpbZebaZpby
**Шаг 2.** DhfZg^Z 5 20 ijh\h`^Z_fZy ex[uf lj_[m_fuf h[f_ghf ^Zgguo
**Шаг 3.** Nmgdpbhg Zevg Zy DhfZg^Z hij6 %Z_fZy ex[uf lj_[m_fuf h[f_ghf ^Zgguo

Hq_gv \Z`gh ke_^h\Zlv aZ wlhc ihke_^h\Zl_evghklvx dZ`^uc djZ DS18B20 h]^Z
ihkdhevdm '6 % g«hl[\m^q_»lv _keb ex[u_ rZ]b \ ihke_^h\Zl_evghklvx mxl beb g_
ihjy^d_
Bkdexq_gby ba wlh]h ijZ\beZ khklZ\ehybkl dd 5 2 Zg ^ulk @kdb :\Zj[5 h].
Ihke_ ih^Zqb ex[hc ba wlbo dhfZg^ dhgljhee_j mijZ\e_gby mijZ\ey_fZ
\ha\jZlblvklyary 1 \ ihke_^h\Zl_evghklb hi_jZpbc h[jZs_gby

## B g b p b Z e b a Z p b y

<k_ hi_jZpbb gZ 1-Wire bus) gZqbgZxlky k ihke_^h\Zl_evghklv **инициализации**. lhke_^h\Zl_evghklv bgbpbZebaZpby **импульсы сброса** i_j_^Zggh]h mkljhckl\hf mijZ\e rbghc khijh\h`^Z_fZy **импульсом(ами) присутствия** i_j_^Zggufb ih^qbg_ggufb mkljhck Bfimevk ijbkmlkl\by iha\hey_l mkljhckl\m mijZ\e_gby rbghc agZlv qlh ih^qb '6 % ijbkmlkl\mxl gZ rbg_ b ]hlh\u d jZ[hl_

<j_f_ggu_ oZjZdl_jbklbdb ^ey k[jhkZkhb ijbkmlkl\by ^_lZebabjh\Zgu \

***ПРОЦЕДУРА ИНИЦИАЛИЗАЦИИ: ИМПУЛЬСЫ СБРОСА И ПРИСУТСТВИЯ.***

## Команды ROM

lhke_ lh]h dZd mkljhckl\h mijZ\e_gby rbghc h[gZjm`beh bfimevk ijbkmlkl\by dhfZg^u 520 Wlb dhfZg^u hi_jbjmxl mgbdZevgufb dh^Zfb 520 gZ [blZ ^ey mkljhckl\Z b iha\heyxl mkljhckl\m mijZ\e_gby ijbkmlkl\mxsbo gZ rbg_

Wlb dhfZg^u lZd`_ iha\heyxl mkljhckl\m mijZ\e_gby hij_^_eylv dZd fgh]h ijbkmlkl\mxl gZ rbg_ Z lZd`_ hij_^_eylv ex[h_ mkljhckl\h mijZ\e_gby **состояний** Zmbo\ky \

?klv iyl dhfZg^ 520 b dZ`^Zy dhfZg^Z [blh\ ^ebghc =eZ\gh_ mkljhckl khhl_lkl\mxsmx dhfZg^m 520 i_j_^ i_j_^Zq_c dhfZg^u nmkgl_fZ ^ey %i_jZ;ebhc dhfZg^ 520 ihdZau\Zxl \ Jbkmgd_

## SEARCH ROM [F0h] - (ПОИСК ROM)

Dh]^Z kbkl_fZ i_j\hgZqZevgh \dexq_gZ ]eZ\gh_ mkljhckl\h ^he`gh b^_glbnb ih^qbg_gguo mkljhckl\ gZ rbg_ wlZ dhfZg^Z iha\hey_l mkljhckl\m mijZ\e_gby ih^qbg_gguo mkljhckl\ Mkljhckl\h mijZ\e_gby ijbkmlkl\mxl 520 lj_[m_l qlh=eZ\gh_ mkljhckl\h ^he`gh b^_glbnbpbjh\Zlv h\kqbg_ggguo mkljhckl\ ?keb _klv lhevdh h^gh ih^qbg_g rbg_ [he__ ijhklZy dhfZg^Z Ql_gby 520 kf gb`_ fh`_l bkihevah\Zlvky f_klh i

>ey ^_lZevgh]h h[tykg_gby ijhp_^mju lhbkdZ 520 *Книга Знаний* \ www.ibutton.com/ibuttons/standard.pdf.

lhke_ dZ`^h]h pbdeZ lhbkdZ 520 mkljhckl\h mijZ\e_gby rbghc ^he`gh \ BgbpbZebaZpby \ hi_jZpbhgghc ihke_^h\Zl_evghklb


+38(056) 374-74-45, magetex@e-mail.ua

## READ ROM [33h]

WlZ dhfZg^Z fh`_l lhevdh bkihevah\Zlvky dh]^Z _klv h^gh ih^qbg_ggh_ dhfZg^Z iha\hey_l mkljhckl\m mijZ\e_gby rbghc qblZlv 520 ih^qbg_ggh]h mkl bkihevamy ijhp_^mjm lhbkdZ 520 ?keb wlZ dhfZg^Z bkihevam_lky lZf ]^_ [h mkljhckl\h gZ rbg_ ijhbahc^_l dhgnebdl gZ mjh\g_ ^Zgguo lZd dZd \k_ ih^qb ihiuldm hl\_lblv \ h^gh b lh `_ \j_fy

**MATCH ROM [55h] Соответствие ROM [55h]**

DhfZg^Z khhl_lkl\by 520 khijh\h`^Z_fZy ihke_^h\Zl_evghklvx dh^Z 520 gZ
mkljhckl\m mijZ\e_gby rbghc h[jZsZlvky d hij_^_e_gghfm ih^qbg_gghfm mklj
ih^qbg_ggh_ mkljhckl\h dhkhjh_lkl\m_l [blZf ihke_^h\Zl_evghklb dh^Z 520
nmgdpbhgZevgmx dhfZg^m \uims_ggmx ]eZ\guf mkljhckl\hf <k_ ^jm]b_ ih^qb
[m^_l `^Zlv bfimevkZ k[jhkZ

**SKIP ROM [CCh] Пропуск ROM [CCh]**

=eZ\gh_ mkljhckl\h fh`_h\Zlvwm dhfZg^m qlh[u h[jZlblvky dh \k_f mkljhc
h^gh\j_f_ggh GZijbf_j ]eZ\gh_ mkljhckl\h fh`_h\Zlvwm dhfZg^m qlh[u \k_ '6 % ^Zlqbdb l_fi_jZl
gZ rbg_ gZqZeb h^gh\j_f_ggh l_fi_jZlmjgu_ ij_h[jZah\Zgby >ey wlh]hmg_h[
dhfZg^m ljhimkdZ 520 ihijh\h`^Z_fmx dhfZg^hc L_fi_jZlmjgh]h ij_h[jZah\Zgby >
*Обратите внимание* qlh dhfZg^m ?GB? I:FYLBah_l ke_^h\Zlv aZ dhfZg^hc ljhi
lhevdh _keb gZ rbg_ ijbkmlkl\m_l h^gh ih^qbg_ggh_ mkljhckl\h DhfZg^Z ljhim
dhfZg^hc ?GB? I:FYLBah_l dhgnebdl gZ mjh\g_ ^Zgguo gZ rbg_ _keb gZ rl
ih^qbg_ggh]h mkl\Z lZd dZd \k_ mkljhckl\Z [m^ml iulZlvky h^gh\j_f_ggh i_j_^Z

**ALARM SEARCH [ECh] Поиск Тревоги [ECh] (состояние Тревога)**

Hi_jZpby wlhc dhfZg^u b^_glbqgZ hi_jZpbb dhfZg^u lhbkdZ 520 aZ bkdex
'6 % ^Zlqbdb l_fi_jZlmju k mklZgh\e_gguf neZ`dhf Z\Zjbb hl_lyl WlZ
]eZ\ghfm mkljhckl\m hij_^_eylv dZ b_ki'6lZ%b -kb]gZevhy_b_khl l_q_gb_ g_^Z\g
l_fi_jZlmjgh]h ij_h[jZah\Zgby lhke_ dZ`hhjh\ **Тревоги** eZh _klv dhfZg^Z $ODUP 6
khijh\h`^Z_fZy h[f_ghf ^Zgguo mkljhckl\h mijZ\e_gby rbghc ^he`gh \ha\
BgbpbZebaZpby \ hi_jZpbhgghevghkl b^h\Zl_

## ФУНКЦИОНАЛЬНЫЕ КОМАНДЫ - DS18B20

lhke_ lh]h dZd mkljhckl\h mijZhe_gbhy redbhZg^m 520 qlh[u h[jZlblvky d '6 dhlhjuf hgh `_eZ_l k\yaZlvky mkljhckl\h mijZ\e_gby ^he`gh mkl^ba dhfZg^ nmgd '6 % Wlb dhfZg^u iha\heyxl \uihegblv nmgdpbb aZibkb beb ql_gby hi_jZl bgbpbZebabjh\Zlv l_fi_jZlmjgu_ ij_h[jZah\Zgby beb hij_^_eblv j_`bf we_dljhib

Nmgdpbhgevgu_ dhfZg^u '6 % hibkZggu_ \ gbZ[ebk\m_^_g ijhbeexkljbjh\Zg [eh-ko_f_ Jbkmghd

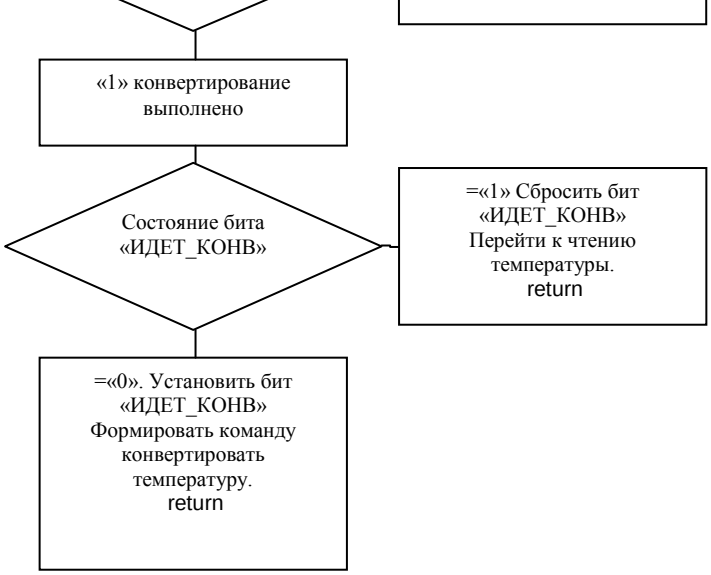
### Конвертировать температуру [44h]

WlZ dhfZg^Z gZqbgZ_l _^bgkl_ggh_ l_fi_jZlmjgh_ ij_h[jZah\Zgb_ lhke_ hd ^Zggu_ khojZgyxlky jZ\lh\hf l_fi_jZlmjghf j_]bklj_ \ ghc_jZlylb Z '6 % ***возвращается в неактивное состояние*** k gbadbf wg_j]hihlj_[e_gb_f ?keb mkljhckl\h bk j_`bf_ iZjZablgh]h iblZgby lh \ ij_^_eZo g_ iha`_ fdk fZdkbfZevguc il mkljhckl\h mijZ\e_gby ^he`gh mklZgh\blv \ukhdbc mjh_gv gZ rbg_ gZ \j ij_h[jZah\Zgby (conv).

?keb '6 %***питается от внешнего источника питания*** ]eZ\gh_ mkljhckl\h fh`_l kqbl khklhygb_ rbgu ihke_ dhfZg^u Dhg_jlbjh\Zgby **[44h].** l?kebjZ\ZmjubG_ eh]bq_kdbc ©G wlh agZqbl qlh '6 % \uihegy_l l_fi_jZlmjgh_ ij_h[jZah\Zgb_ ?keb gZ–rbg_ wlh agZqbl qlh ij_h[jZah\Zgb_ hdhkqqblgh bvfhZgbu

< j_`bf_ bkihevah\Zgby iZjZablgh]h iblZgby wlZ f_lh^bdZ bmkhevah\Zgby _lZ dZd rbgZ ^he`gZ [ulv \ \ukhdhf khklhygbb \ l_q_gb_ \k_]h pbdeZ ij_h[jZah\Zgb

H[jZlbl_ \gbfZgb_ qlh f_lh^bdZ dhgljhey \j_f_gb ij_h[jZah\Zgby ih khklhygb qlh ihke_ dhfZg^u dhg_jlbjh\Zgby lljhckZlmjuZk e_gby ^he`gh ihkueZlv gZ r \j_f_gb b dhgljhebjh\Zlv [bl khklhygby dhg\_jlbjh\Zgb_ b^_l– dhke\b_jlbjh\Zgb_ \uiheg_gh b fh`gh kqblu\Zlv l_fi_jZlmjm DS18B20 ?keb DS18B20 hl_qZ_l gme_f lh



```
ljbf_j ijh]jZffu ^ey jZ[hlu k h^gbf mkljhckl\hf gZ ebgbb
;=========================================================================
                                        ql_gb_ l_fi_jZlmju
celsio                                ;
;=========================================
  baf_j_gb_ l_fi_jZlmju               ;
            call    DOUT_LOW            kehl ql_gby ^ey dhgljhey
            call    DOUT_HIGH           hdhgqZgby dhg\_jlbjh\Zgby
            btfss   DALLAS            ;
      return                          ;
            btfsc   CON               ;
      goto  ctenie                    ;
            call    RESET_DALLAS      ;
            btfsc   ERROR_D           ;
      return                        ^Zlqbd g_bkijZ\_g ij_j\Zlv dhg\_jlbjh\Zgb_ l_fi
;=========================================
            movlw H'CC'               ; nhjfbjh\Zlv dhfZg^m ljhimkl\ ROM
            call    DSEND             ;
            movlw H'44'               ; nhjfbjh\Zlv dhfZg^m Dhg\_jlbjh\Zlv l_fi_jZlm
            call    DSEND             ;
;=========================================
            bsf     CON                 b^_l dhg\_jlbjh\Zgb_
      return                          ;
;=========================================
ctenie                                  ql_gb_ l_fi_jZlmju
            bcf           CON         ; dhg\_jlbjh\Zgb_ \uiheg_gh
;=========================================
            call    RESET_DALLAS      ;
            btfsc   ERROR_D           ;
      return                        ^Zlqbd g_bkijZ\_g ij_j\Zlv ql_gb_ l_fi_jZlmju
            movlw H'CC'                 ihkeZlv dhfZg^m ljhimkl\ ROM
            call    DSEND             ;
            movlw H'BE'                 ihkeZlv dhfZg^m ql_gby iZfylb
            call    DSEND             ;
            call    DRECEIVE            qblZlv   [Zcl
            movf    COM_REG,W         ;
            movwf TEMP_LO             ;
            call    DRECEIVE            qblZlv   [Zcl
            movf    COM_REG,W         ;
            movwf TEMP_HI             ;
      return                          ;
```

**Запись в память [4Eh]**

```
WlZ dhfZg^Z iha\hey_l mkljhckl\m mijZ\e_gby aZibku\Zlv   [ZclZ ^Zgguo \ iZ
l_j\uc [Zcl ^Zgguo aZibku\Z_lky TH j_]bklj hc [Zcl aZibku\Z_lky TL j_]bklj hc
[Zcl aZibku\Z_lky \ j_]bklj dhgnb]mjZpbb
>Zggu_ ^he`gu [ulv i_j_^Zgu gZbf_gvrbf agZqZsbf [blhf \i_j_^
>ey ^Zlqbdh\ l_fi_jZlmju k iZjZablguf iblZgb_f \k_ ljb [ZclZ >HE@GU [ulv
DHIBJH<:GB? HAM <hIAJM`>_  q_f mkljhckl\hf mijZ\e_gby [m^_l k]_g_jbjh\Zg b
bgZq_ ^Zggu_ [m^ml ihl_jygu
```

**Чтение памяти [BEh]**

```
WlZ dhfZg^Z iha\hey_l mkljhckl\h mijZ\e_gby aZibku\Zlv kh^_j`Zgb_ l:FYLB l_j_^ZqZ
gZqbgZ_lky k gZbf_gvr_]h agZqZs_]h [blZ [ZclZ hbhijZ\ZZ[Zkqb^heb-q_kdbc
dhgljhev ba[ulhqghklb Mkljhckl\hh mijZ\e_gby k[jhk qlh[u aZdhgqblv ql_gb
\j_fy _keb g_h[oh^bfh lhevdh qZklv ^Zgguo
```

**Копирование ОЗУ В ПЗУ [48h]**

WlZ dhfZg^Z dhibjm_l kh^_j`ZgbTH, Tlj_]bkljh\klj Z dhgnb]mjZpbb [Zclu b
?keb mkljhckl\h hevam_lky \ j_`bf_ iZjZablgh]h iblZgby lh \Vij_^_eZo g_
fZdkbfZevgh ihke_ ih^Zqb wlhc dhfZg^u mkljhckl\h mijZ\e_gb_ ^he`gh mklZg
rbg_ b ih^^_j`b\Zlv _]h \ l_q_gbb g_ f_g__ PV

**Повторная загрузка [B8h]**

WlZ dhfZg^Z ih\lhjgh aZ]jm`Z_l agZq_gbTH, Tlj_]bkl\jZ\ggu_ \ j_]bklj dhgnb]mjZp
jZaf_sZ_l ^Zggu_ \ [Zclu b khhl_lkl_ggh \ iZfylb =eZ\gh_ mkljhckl\
ijhp_kk aZ]jmadb HAM ba IAM kqblu\Zy khklhygb_l hr<blgHJG:Y_A:=JMAD:\u
rbg_ eh]bq_kdbc ©wlhevaagZqbl b^_l hi_jZpby i_j_aZ]jmadb _keb eh]bq_kd
\uiheg_gZ
Hi_jZpblyH<LHJG:Y A:=JMAD:\u%ekg@_lky Z\lhfZlbq_kdb ijb \dexq_gbb iblZg
^hklmigu kjZam ihke_ \dbeZ\gbyby

**Вид электропитания датчика [B4h]**

=eZ\gh_ mkljhckl\h ]_g_jbjm_l wlm dhfZg^m qlh[u hij_^_eblv bkihevam
iZjZablgh_ iblZgb_ ?keb ihke_ ih^Zqb dhfZg^u gZ rbg_ ijbkm-kl\lm_alZ\gbb
'6 % bkihevam_l \g_rg__ iblZ
_^bgbpZ-H[jZlbl_ \gbfZgb_ ihke_ ih^Zqb dhfZg^u hijhkZ g_h[oh^bfh knhjfbjh\
ihke_ dhlhjDS18B20 \uklZ\bl gZ rbgm [bl khklhygby dhlhjuc fh`gh khkqlbl\ZkevhlZl_
\j_f_gb

**C.2. Краткий обзор Команды**

MkljhckliZ Buttons fh]ml jZ[hlZlv dZd Z\gZgbhbgh_Zd b ih^^_j`b\Zex_l^mxsb_ K_l_\u_
DhfZg^u gZ hkgh_ 520

- Ql_gb_ 520 **[33h]** *(Read)*
- Ijhimk 520 **[CCh]** *(Skip)*
- Khhl_lkl\ROM **[55h]** *(Match)*
- Ihbkd 520 **[F0h]** *(Search)*

Ihke_ \uiheg_gby ex[hc dhfZg^mukljh\ 520 kl\Z ^hklb]Z_l mjZhg\giyhjlZkihkh[gh
i_j_^Z\Zlv k\hb ^Zggu_ iZfylb

**Чтение ROM [33h]** *(Read)* bkihevam_qkhy[u ijhqblZlv 520 iZfylb g_h[oh^bfh \hkihev
lhevdhm^ghlhke_ ihkuedb wlhc dhfZg^u_ mkljhckl\h_g ]_g_jZlyh\ kehlZ \j_f_gb
kqblu\Zgby Button ihre_l kh^_bjf`h__]h ROM iZfylb feZ^rb[fblhf \i_j_^ gZqbkZdyh^Z
k_f_kl\Zkhijh\h`^Z_fk]hjbcguf ghf_jhf b [Zclhf pbdebq_kdh]h dhgljhey ba[ulhqg

?keb gZrbg_g_kdhei Buttons mkljhckl\h ^ey ql_gby 520 iZfylb g_h[oh^bfh \hkihev
dhfZg^u **Поиск ROM [F0h]** *(Search)* qlh[u hij_^_eblv kh^_j`ZgbZfylb mkljhckl\ ij_`^_ q_f
gbf fh`g[m^_h[jZlblvky

?keb kh^_j`Zgb iZfylb g_ ij_^klZ\ey_l bgl_j_k ihgZfmbq_lhlhevgh Button, ihbkd
fh`_l [ulv ijhim,sihgkueZy dhfZg^u **Пропуск ROM [CCh]** *(Skip).* G_f_^e_ggh ihke_ wlhc dhfZ
mkljhckl\h ^hklbjjZg_kihjlgh]h mjh\gy

DhfZg^u Khhl_lkl\b_ **[55h]** *(Match)* fh`_l bkihevZlvky qlh[u h[jZlblvky d bgl_j_kn
mkljhckl_keb gZ rbg_ ijbkmlkl\m_ Buttons kmkeyhdhl\

DhfZg^u ROM \uihegy_l nmgZ\p_xZ mkljhckl\Z qlh[u Zdlb\b_ajhlj_ZgZ\ihjlguc mjhl_hgv
`_ kZfuDh^ 520 g_ fh`_l Zdlb\bjh\Zlv [he__ mkljhckl\Z lZd dZd khhl_lkl\b_

h^ghfm mkljhckl\m hijijb_beo_gjhba\h^k?\keb iButtons bf_xl lh `_ kZkfhjbcgugchf_j
bo k_f_cgu_ dhh^ml[hlebqgu Wlbhf,kihdkex[qZ_ekyhc [_kihjyh^ehd g_h^je_gghklv

Ihke_ ih^Zdhf Zg^u **Соответствие ROM [55h]** *(Match)*, =eZ\ghm_kljhckl\hm^_l ihkeZgh \ l_q_g
ke_^mxsbo kehlh\ \kjh^_jbZgh ROM iZfylb lj_[m_fh]h mkljhckl\Z^h\Zl_evghklv [blh
^he`gZ [ulv l_f `_ kZfufhendZ_dguhdjbgb 52.0 b lh _kfeZ^rbf[blhf \i_j_^
gZqbgZykv k khf dhg^hZ] khijh\h`^Z_fh]h k_jbcguf ghf_jhf b pbdebqukhdgbkhlbljh
<kiButtons 520 dhlhjbg]hkhhl_lkl\m_l lj_[mhf^hhfkmZgmlky \ g_Zdlb\ghf ikhdZhlygb
ihemqZjlm]hc Bfimevk K[jhkZ

## C.3. Команда Поиск ROM [F0h] *(Search)*

?keb =eZ\gh_ mkljhckl\hgZ_l k_jbcgugf_mkljhckl\h^dexq_ggch]hbg_lh kms_kl\m_l
\hafh`ghklv b^_glbnbpbjh\ZlROM dhZù^h]h mkljhckl\Z ih^dexq_ggh]heydwlbgh.
g_h[oh^bfh bkihevah\ZlvlhdhkZ 5^ **[F0h]** *(Search)* WlZ dhfZ^g_cZ\m_lZdhfZg^ZZl_gby
ROM h[t_^bg_ggkZlyhfZg^lkchhl_lkl\ROM.

Ijhp_kk \u]ey^bl ke_^mxsbf h[jZahf Ihke_ nhjfbjh\Zgby ]eZ\guf **Поиск**
**ROM [F0h]** *(Search)* \k_ mkljhckl\h^ iButtons ihke_^h\Zl_evgh [m^ml nhjfbjh\Zlv gZ rbg_ khkl
«1» khhl_lkl\mxsb_ bo agZ\dlbgbxkdh]h [blZ 520 \u **двух Времен** lZdlhkqblu\Zgby
ihkenhjfbjh\Zgbyhfg^u 520 lhbkdZ

?keb \k_ mkljhckl\Z \ wlhc ihabpbb ^\hbqgh]h jZajy^Z

- «0» lq_gb_ [m^«01»];
- «1» j_amevlZl «10»;_l

?keb mkljhckl\Z kh^_j`Zl \ wlhc ihabpbb ^\hbqgh]h jZajy^Z ihb© «00» [blh\
mdZau\ZZy dhgnebdl

=eZ\gh_ mkljhckl\h \ ke_^mxs_f lj_lv_f lZdl_ kehl_jZ<ajy^gbaZ\hqfbgjm_l beb

qlh[u hlh[jZkvjhckl\Z dhlhju_ hklZlgmlky_ \u[hjZ

<k_mkljhckl\Z m dhlhjuo [bl g\mkhlbkmkjfbjh\Zgghfm ]eZ\guf mkljhckl\hf i_j_
khklhygb`b^Zgby b [m^ml gZoh^blvkhygb g_fihhdmZqZxl Bfimevk K[jhkZ klhZk^by i_j
\u[hjZ[m^ml ke_^h\Zlv qblZxsbo \u[hjZgZdhgZ,eZ\gh_ mkljhckl\hj_^_ebDh^
ROM h^gjhih^qbg_ggmkhjhckl\h[jZlblvky d.g_fm

DZ`^ZkylZ^by \u[hjZ khklhbl ba ^\mo kehlh\ <j_f_ghb^bkgqbkeuhZg<by fbgb aZibl
Iheguc ijhp_kk bambqhgbyhj_f_ggZy Z^j-_kjZbpbyabl_evgh ljb^ejZbgZ dhfZg^u 520
Khh\l_lkl\by gh wlh iha\hey_lb\u[jZlv k\yaZgguo mkljhckl\ ihkek_^hhZ ROM evgh

<ijbeh`_gb]b^_iButtons mkljhckl\Z ih^dexq_gu d h^gwlh yhey_lky kZfuf wnn_dlb\
kihkh[hf qlh[u hij_^_eblv dh^u \k_ 520 ih^qbg_ggu o mkZ\hgchk_l\mkhlkhec_kl\h]hh`_
bkihevah\Zlv dhfZg^m 520 Khhl_lkl\by qdhhu ij_^jZelbgymkhjhmhckl\m

?keb ijbeh`_gb_ lj_[m_l ihklhygghc bb^_ghhfmbgZ\bgbb\ufhmkljhckl\ZlZd dZd
hgb fh]ml ih^dexqZlvky b hldexqZlk,ylhmkhl^hcjZ[hlmijZ\e_gby[m^hefghkihevah\Zlv
dhfZg^lmbk520 qlh[u b^nbgbbjh\Zdlh^u 520eyh[jZsZlvky d dZ`^hfmmgkhjhckl\m

;eh-ko_f_ \k_o DhfZg^ 520 ihdZau\Zxl \5-2eexkljZpbb

LZd dZd eh]bdZ dhfZg^u 520 ihkekdZgjhcp_kkke_^mxsbc ijbf_j bkihevam_lky
beexkljbjh\Zlvh rZ] aZ rZ]hf

Q_luj_ mkljhckl\Zgh\e_gu gZ rbgh_bqgbkh^_j`Zgb_ 52-0_^mxs__

mkljhckl\h [[[[[[
mkljhckl\h [[[[[[
mkljhckl\h [[[[[[
mkljhckl\h xxxxx10001000

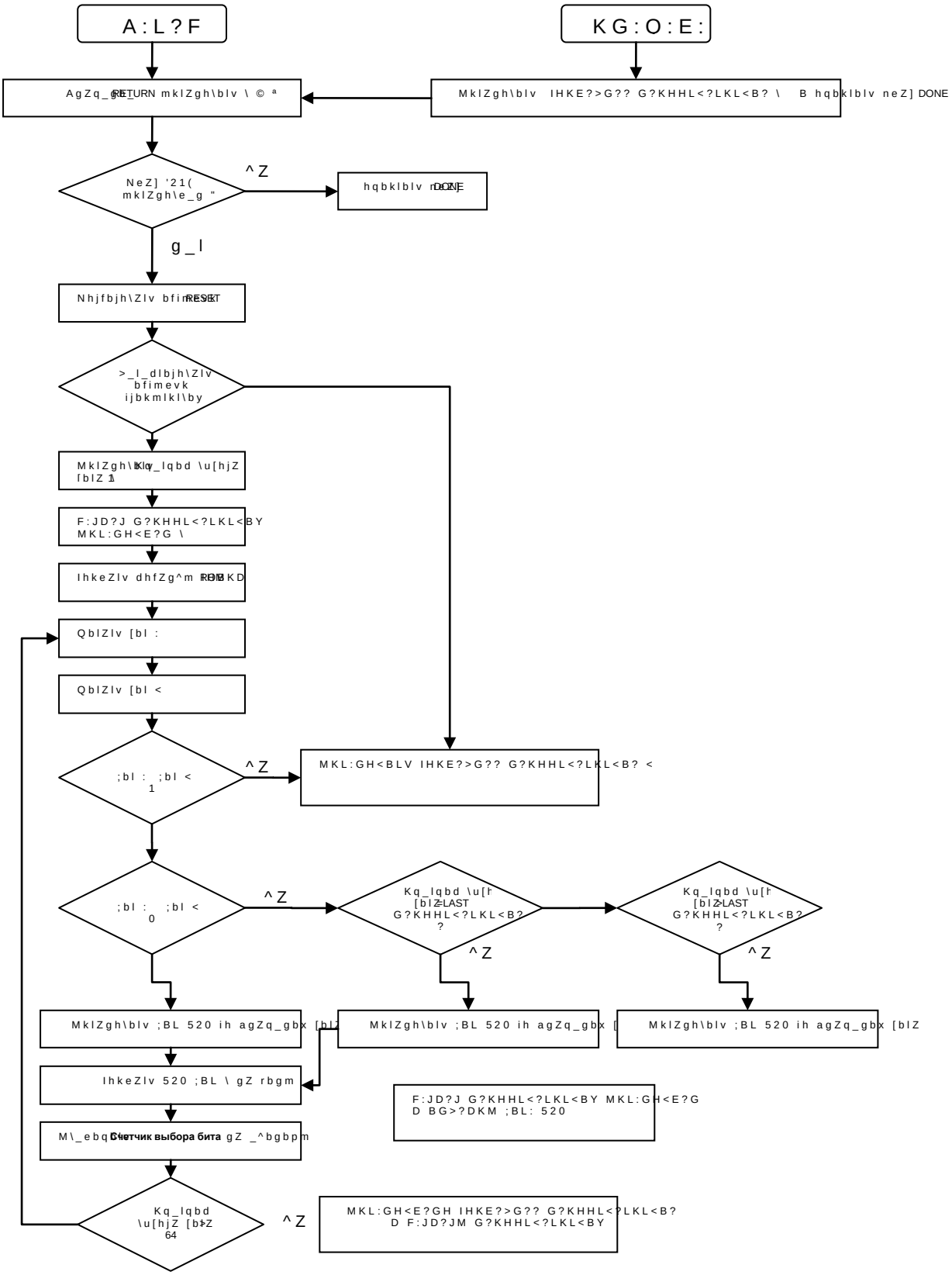
^ey mijhs_gkbyf\hehfx»©aZf_g_gkuZjrb_[blub ihdZaZgjuevdh feZ^\bk_fv [blh\
kh^_j`Zgby 52-0bkd feZ^r_]h [blZ ijhbkoh^blv ke_^mxsbf h[jZahf

1. =eZ\gh_ mkljhckl\hgZ_l ihke_^h\Zl_evghklv bgbpbZebaZpbb
   - nhjfbjm_l **Импульс Сброса**.
   - iButtons hl_qZxnlhjfbjh\Zgbym **импульсов Присутствия**.
2. Lh]^Z =eZ\gh_ mkljhckl\h^ **Поиск ROM**.

3. =eZ\gh_ mkljhckl\Z h^bg [bl k rbgmukljhckl\Z h_l h^bg [bl k rbgmukljhckl\Z h_l h^bg [bl k rbgmukljhckl\Z h_l h^bg [bl k rbgmukljhckl\Z h_l h^bg [bl k rbgmukljhckl\Z h_l h^bg [bl k rbgmukljhckl\Z h_l h^bg [bl k rbgmukl
[blZkhhl_lkl\mxs_]h _]h ^Zgg Mukl\Z b ihf_klyZ ©r»ghm _klv mgkbZgh\yl gZ rbg_ gbadbc mjh_gv Mkljhckl\Z b«1» ikmh\jhf ejyZelbgbhklZ\Zlv k\ukhdhf mjh\g_ J_amev-kZeh]bq_kdh=h\k_o mkljhckl\ gZ ebgfbm=eZ\gh_ mkljhckl\Z h_l
=eZ\gh_ mkljhckl\Z h_l qblZev_^mxsbbd (K l_o idjh]^ZhfZg^Z 6HDUFK 520 \uihegy \k_mkljhckl\Z hl_hq^Zgxhl\j_f_gg<hk_ mkljhckl\Z ihfgZZxbdgm **дополнение первого бита** bo khhl_lkl\mxs_]h Mkljhckl\Z jfbjm«1» mkljhckl\Z knbjfbjm«0» LZdbfjZahfgZ rbg_[m^_lkhklhygb_ eh]bq_kdh=eZ\gh_ mkljhckl\Z qblZ«0» ijb nhjfbjh\Zgbb ^hihegbl_evgh]hi_dhh^Zh bgnhjfZpbhggh]h jZajy^Zgb 520 ^Z_b» ©00 *состояние разрядных конфликтов*) Wlh ]h\h=eZ\ghfm mkljhckl\Z kZ^rbgZsb_ \ i_j\hf [bl_ dZd ª© lZd b. © ª
?kehu\k_ mkljhckl\Z «01» ebwlhc ihabpbb ^\hbqgh]hl_jZajy^Zehq [u j_amev;lZl © _kehu ihabpby ^\hbqgh]h jZajy^Z\khh\k_jòZmZkljhckl\Zam©evlZl [u«10»u
4. =eZ\gh_ mkljhckl\hv j_rZ_l ibkZ«1»v nhjfbjm_l aZibkv _]h gZ rbgm WlZ i_j_\h^bMkljhckl\ b kh^_j`Zsb_ \ wlhf jZajy^_iZ©kb\gh_ khklhygb_ hklZ\eyy mkljhckl\Z4 ^ebymqZklby \ ijhp_kk_ ihbkdZ
5. =eZ\gh_ mkljhckl\hegy_l _s_ ^\Z ql_gby b«01»emWlZhl\hjblqlh \k_ Zdlb\gu_ mkljhckl\Z bf_xl \ wlhc ihabpbb ^\hbqgh]h jZajy^Z bo 520
6. =eZ\gh_ jmkl\hh]^Z ibr_l qlh[u khojZgblv mkljhckl\Zufbb
7. =eZ\gh_ mkljhckl\hegy_l ^\Z ql_gby b ihe«00»qZ_lu^\ZWlh kgh\Z mdZau\Zlf qlh jZajy^_ ijbkmlkl\mxl mkljhckl\Z»bf«0xsb_ ©1
8. =eZ\gh_ mkljhckl\hZ ibr_l ^WZhdlb\bjm_l mkljhckl\hZ\eyy mkljhckl\h _^bgkl_gguc Zdlb\guc we_f_gl
Ke_^mxsb_ ql_gby dhgpZ 520^Z\ZZlv khklhygb_ jZajy^guo dhgnebdlh\ jZajy^guo dhgnebdlh\ ^h dhgpZ pbdeZ ihbkdZ ]h\hjblROM khiejvbkohm^bh]hl_Zgdlb\g we_f_glZjhqblZ\ ke_^mxsbc=eZ\gh_ mkljhckl\hZhkueZ_wlhl [bl qlh[u khojZgb mkljhckl\Zdlb\gufDZdhevdh \k_ [520 mkljhckl\Z ba_klgu b ihbkle_k^gh\Z ihkeZg =eZ\ugf mkljhckl\hmkljhckl\h ]hlh\ihjbgdylvdhfZg^m LjZgkihjlgh]h ^mejh\ghy[f_gZ bgnhjfZpb._c
**10. Главное устройство должно изучить данные ROM других устройств.**
Ihwlhfmgh aZimkdZe_l^mxsimke_^h\Zl_evghklv Ihbkd Zh 520, rZ]b7. -
11. **В самой старшей позиции** ^\hbqgh]h jZajy^Z=eZ\gh_ mkljhckl\Zhe © ª \ i_j\hf ijhoh^_ rZ,]hghl_i_jv ibr_«1» Wlhgbf Z_l \u^_e_gb_ mkljhckl\Z hklZ\eyy mk Zdlb\gu
DZd \ rZ]_ ke_^mxsb_ ql_gby 520 gh dhgpZ Z\ZlV khklhyy^gbuf jZajnebdlZf Wlbfa ZdZgqbkZ\lhjhc Ihbkd 520 =eZ\gh_ mkljhckl\hu\Z_klh^_j`Zgb_ 520m]h]h mkljhckl\Z
**13. Главное устройство должен изучить данные ROM других устройств.**
Ihwlhfmgh aZimkdZe_l^mxsimxke_^h\Zl_evghklv Ihbkd Zh 520, rZ]b3.
<h \lhjhfhoh^_ gZb\ukr_c kl_i_gb ihabpby ^\hbqgh]h=eZ\gh_ mkljhckl\h gZibkZe \ i_j\hf ijhoh^_ rZ] wlh l_Wlhjvkgbrf_Zl_l \u^_e_gb_ mkljhckl\ b mkljhckl\Z Zdlb\gufb
15. =eZ\gh_ mkljhckl\hkueZ_l ^\Z kehlZ \j_f_gb kqblu\Zgby b ihemqZ_l ^\Z [blh\ mdZau\Zy fZe_gvdbc dhgnebdl
16. =eZ\gh_ mkljhckl\hZ j_rZ_l ibkZlv Wlh kgbfZ_lmkluj^h_ck_l\hb_ hklZ\eyy mkljhckl\h dZd _^bgkl_ggmkl\Zdlb\gh_
DZd Z]r ke_^mxsb_ ql_gby 520 gh dhgpZ^_l ihdZau\Zlv jZajy^guf dhgnebd aZdZgqbkZ\l_lbc Ihbkd 520 ijhoh^=eZ\gh_ mkljhckl\hbamq_gguc kh^_j`Zgb_ ^jm ROM.
18. =eZ\gh_ mkljh^ckl\hg bamqblv ^Zggu_ 520 ^jm]bo mkljhckl\
Ihwlhfm wlh aZimkdZ_l ^jm]mx ihke_^h\Zl_evghklv Ihbkd Z 520
ih\lhjyy rZ]b-15.
< kZfhc \ukhdhc ihabpbb ^\hbqgh=eZ\gh_ mkljhckl\hZ Ihbkd Ze D
\ ij_^u^ms_f ijhoh^_ klmiZxl wlh l_i_jv ibr_l
Wlh kgbfZ_l \u^_e_gb_ mkljhckl\Z hklZ\eyy mkljhckl\h Zdlb\gu
DZd \ rZ]_ ke_^mxsb_ ql_gby 520 gh dhgpZ ihdZau\Zlv jZajy^guf dhgneb aZdZgqbkZ\l_jluc Ihbkd 520 ijhoh^=eZ\gh_ mkljhckl\hbamq_gguc kh^_j`Zgb_ ^jm ROM.

H[sbc ijbgpbi wiljh]h_kkZ ihbkdZ ^he`_g kgylvh\ug^h_emkjh_ckl\h aZ ^jm]bf \ d
ijhlb\hj_qb\hc ihabpbb ^\hbqgh]h djhZgajy^Z`^h]h ijhp_kkZ lh=bekZ\Zgh520mkljhckl\h
magZe kh^_j`Zgb_ ^jm]h]h 520 Ke_^ymxesyb_clkjyhoh^f `_ kZfuf dZd ij_^u^
imgdliZke_^g__ j_r_gb_ < wlh=fZ\mgghd_mkljh\ckl\hbl \ ijhlb\hiheh`jmdkhv\h^kl\h b
ijh^he`Z_lky ?keb ^jm]hc dhgnekgdh\ZgZcgZ\gbkZg b lZd ^Ze__ lhke_ h[hbo i
\ukhdhifjhlb\hj_qb\Zy ihabpby ^\hbqgh]h khijZ\ahy^Z_lky ^h=dhZ\gZ_ mkljhckl\h
lhl `_ kZfuc imlv dZd ij_`^_ gh j_rZxsbc ijh[hbehihegbgdhc ijhlb\hj_qb\hc ih
^\hbqgh]h jZajy^Z b lZd ^Ze_gu^h 520 ob^_glbnbpbjh\Zgu
Hilbfbabjh\ZggZykbe_lfZ Ze]hjblfZlh 520 dZ
ihdZaZZ\gbeexkljZpbb W\lh qbkeh h[tykgy_l dZd [subichgbkd 520 JZ^bekwdh]h
ko_fZ ^Zggu_ 520 gZdhie_gu \fZkeb_gZdhZgguc ;bl 520 k [blZfb gm64jh\Ze
MklZgh\dZ ^hgeZ\gbZ\bl_ i_j_^ ex[hc ^jm]hcqhmgudhbgbpbZebabkhkZl_fZ k ijh\h^hf
A\hghd \ l_j\u_ k[jhku gZ\bqZehd b b^_glbnbpbjm_l i_j\uc dh^ 520 AZl_ifbau
b^_glbnbpbjmcl_ ihke_^h\Zl_evgu_ dh^u 520 Ehaghs_hgZ\qZgbu\Z_l g_ [hevr
dh^h\ 520 dhlhju_ Zc^mgu-gj_fy lj_[m_fh_ bamqZlv kh^_j`Zgb_ h^khhZy 520
ijhp_kkhjgh_ \j_efZ\gh_ mkljh-960 ms + (8+3*64) *61 PV PV LZdbf h[jZahf \hafl
b^_glbnbpbjh\Zlv ^h jZ\ubqgu_ c_dmg^m

**ROM COMMANDS FLOW CHART** Figure 11


A:L?F
KG:O:E:
AgZq_gbx RETURN mklZgh\blv \ © ª
MklZgh\blv IHKE?>G?? G?KHHL<?LKL<B? \ B hqbklblv neZ] DONE
NeZ] '21( mklZgh\e_g "
^Z
hqbklblv neZ] DONE
g_l
Nhjfbjh\Zlv bfimevk RESET
>_l_dlbjh\Zlv bfimevk ijbkmlkl\by
MklZgh\blv Kq_lqbd \u[hjZ [blZ 1
F:JD?J G?KHHL<?LKL<BY MKL:GH<E?G \
IhkeZlv dhfZg^m RESET
QblZlv [bl :
QblZlv [bl <
;bl : ;bl < 1
^Z
MKL:GH<BLV IHKE?>G?? G?KHHL<?LKL<B? <
;bl : ;bl < 0
^Z
Kq_lqbd \u[hjZ [blZ LAST G?KHHL<?LKL<B? ?
^Z
Kq_lqbd \u[hjZ [blZ LAST G?KHHL<?LKL<B? ?
^Z
MklZgh\blv ;BL 520 ih agZq_gbx [blZ
MklZgh\blv ;BL 520 ih agZq_gbx [
MklZgh\blv ;BL 520 ih agZq_gbx [blZ
IhkeZlv 520 ;BL \ gZ rbgm
F:JD?J G?KHHL<?LKL<BY MKL:GH<E?G D BG>?DKM ;BL: 520
M_ebqbZ gZ _^bgbpm
Счетчик выбора бита
Kq_lqbd \u[hjZ [blZ 64
^Z
MKL:GH<E?GH IHKE?>G?? G?KHHL<?LKL<B? D F:JD?JM G?KHHL<?LKL<BY

## DS18B20 FUNCTION COMMAND SET Table 4

| Команда | Описание | Код | Состояние шины после передачи команды | Примечания |
|---|---|---|---|---|
| **КОМАНДА КОНВЕРТИРОВАНИЯ ТЕМПЕРАТУРЫ** | | | | |
| Baf_j_gb_ l_fi_jZlmju<br>Convert T | BgbpbZebabjm_l gZ qZeh baf_j_gby l_fi_jZlmju | **44h** | '6 % \u^Z_l gZ rbg j_amevlZl ij_h[jZah\Zgby l_fi_jZlmju. **После формирования слота чтения** 0 – b^_l dhg_jlbjh\Zgb_ dhg_jlbjh\Zgb_ \uiheg_gh beb g_ b^_l | 1 |
| **КОМАНДЫ РАБОТЫ С ПАМЯТЬЮ** | | | | |
| Ql_gb_ iZfy<br>Read Scratchpad | QblZ_l \kx iZfylv \c [Zcl pbdebq_kdh]h dhgEhey ba[ulhqghklb | **BEh** | DS18B20 ]hlh\h i_j_^Zlv dhfZg^u ql_^gby [Zcl ^Zgguo mkljhckl\m mij. | 2,3 |
| AZibkv \ iZfy<br>Write Scratchpad | AZibku\Z_l ljb [Zc j_]bkljTH, TL b j_]bkl dhgnb]mjZpbb | **4Eh** | Mkljhckl\h mijZ\e_gby i_j_^Z_l [ZclZ ^Zgguo d '6 % | 4 |
| Dhibjh\Zgb_ < IAM<br>Copy Scratchpad | Dhibjm_l agZ TH, TL b j_]bkljZ dhgnb]mjZpbb HAM \ IAM | **48h** | G_l dhgljhey | 1 |
| Ih\lhjgZy aZ]jmadZ<br>Recall E2 | Ih\lhjgZy aZ]jmadZ TH, TL b j_]bkljZ dhgnb]mjZpbb IAM \ HAM | **B8h** | DS18B20 **после формирования слота чтения** 0 – b^_l aZ]jmadZ, 1 – aZ]jmadZ \ dZheg_gZ | |
| <b^ we_dljhiblZgbyHij_^_ey_l lbi iblZgby DS18B20.<br>Read Power Supply | | **B4h** | **DS18B20 после формирования слота чтения** 0 – iZjZablgh_ iblZgb_ – \g_rg_iblZgb_ | |

**ПРИМЕЧАНИЯ:**

1) Ijb iZjZablghf iblZgbb '6 % V =eZ\gh_ mkljhckl\h ^he`gh \u^Zlv gZ r l_q_gb_ l_fi_jZlmjgh]h ij_h[jZah\Zgby b dhibjh\Zgby dZ HAM mjm]Z AMhi_jZpby gZ wlh \j_fy g_ fh`_l \uihegylvky
2) =eZ\gh_ mkljhckl\h fh`_l ij_j\Zlv i_j_^Zqm ^Zgguo \ ex[h_ \jZ lyhrbfimev ]h\hjy ijhqblZeb ex[h_ dhebq_kl\h [Zclh\ [blh\ b \k_
3) Ijb ql_gbb l_fi_jZlmju ^h dhfZg^u l_fi_jZlmjgh]h ij_h[jZah\Zgby wlh bdqZ_lky aZibku\Z_lky \ j_]bklj l_fi_jZlmju ijb ih^Zq_ iblZgby gZ ^Zlqbd dh^ bgbpb
4) <k_ ljb [ZclZ ^he`gu [ulv khojZg_gu \ IAM ijk_nhj_fbjh\Zgb_ \ Zgb_ ^ikkjhkl

Khijhlb\e_gb_ **резистора** gZ^h \u[bjZlv ba dhfijhfbkkZ f_`^m khijhlb\e_gb_f bkihevab \g_rgbfb ihf_oZfb Khijhlb\e_gb_ j_abklhjZ fh`_l [ulv hl ^h dHf >eykhijhlb\e_gb_f `be gZ^h bkihevah\Zlv [he_ khijhlb\e_gb_ : lZf ]^_ ijbkmlklijhfure_ggu_ ihf_oZfb [bjZlv [he__ gbadh_ khijhlb\e_gb_ b bkihevah\Zlv dZ[_evk_q_gb_f ijh\hejZ l_e_nhgghc eZirb `beu ^ey f_ljh\ g_h[oh^bfh j_abklhjijbf_gy_l_ ©\blmxª iZjZm_ dZl_]hjbb ^ebgZ fh`m l_ebqv gZ f_ljh\ =:J:GLBJH<:GGH : ijb bkihevah\Zgbb ko_fu k \g_rgbf ^jZc_jhf ^h

## 1-wire signaling

DS18B20 bkihevam_l kljh]bc ijhlhdhe d1-Wire bjZ\ph^hf qlh[u aZkljZoh\Zlv p_ehk ^Zgguo G_kdhevdh lbihmijkb]gZ_gZu \ khhl_lkl\bb k wlbf ijhlhdhehf bfimevk k[ ijbkmlkl\by aZibkv aZibkv ql_gb_ b ql_gb_ Mkljhckl\h mijZ\e_gby nh rbg_ aZ bkdexq_gb_f bfimevkZ ijbkmlkl\by

## Процедура инициализации: импульсы сброса и присутствия

<_kv ijhp_kk k\ya b% gZqbgZ_lky k ihke_^h\Zl_evghklb bgbpbZebaZpbb bfimevkZ k[jhkmZklhjhckl\Z mijZ\e_gbkyhijMMh`^Z_fh]h bfimevkhf ijbkmlkl\byWhh '6 beexkljbjh\Zgh gZ23 jbDkh]^Z '6 %hkueZ_l bfimevk ijbkmlkl\byZ \hjlh\kl wlh mdZau\ MM qlh '6 % gZoh^blky gZ rbjZ[hbZlvlh\

< l_q_gb_ ihke_^h\Zl_evghklb bgbpbZebaZpbb mkljhckl\h mijZ\e_gby rbgh ***сброса*** i_j_f_sZy rb-Wire bus \ khklhygb_bqe_hk]dh]hf bfimevk ***480 µs*** Mkljhckl\h mijZ\e_gb rbghchlimkdZ_bgmib_j_oh^bl \ j_`bf ijbRXfZ Dh]^Z rbgZ hlimsdhZax) ih^ly]b\Zxsbc j_abklhj i_j_f_sZxl \bgmjh\_gv eh]bq_kdhc © ª '6 % h[gZjmihe\Z_bl_evguc i_j_iZ^hg`^_lhl15 µV ^60µs b aZl_f i_j_^ ***импульс присутствия*** i_j_f_sZy rb\gm eh]bq_kdbc © ª gZ ^ebl_60µs^hl240µs

**Initialization timing** figure 13

## Слоты времени - чтения/записи

Mkljhckl\h mijZ\e_gby aZibkhuc\Z^_ZggZu_'6 % \ l_q_gb_ kehlh\ \j_f_gb aZibkb ^Zggu_ hl '6 % \ l_q_gb_ kehlh\ \j_f_gb kqblu\Zgby H^bg [blh^Zgkehb i_j \j_f_gb

## Слоты времени записи

?klv ^\Z lbiZ kehlh\ \j_f_gb

- Kehl\j_f_gb aZibkb «1» - W1
- Kehl \j_f_gb aZibkb «0» - W0

Mkljhckl\h mijZ\e_gby rbghc W1 kehlh\ aZibkZ[lvleh]bq_kdhc\ '6 % W0 qlh[u aZibkZ[lvleh]bq_kdhc\ DS18B20.

<k_ kehlu \j_f_gb aZibkb ^hiehhu e`ublv evghklbyx bfmfhfµs jZa^_e_ggu_ bfimevkh \hkklZgh\e_gby bfmfhfµs. H[Z lbiZ kehlh\ \j_f_gb aZibkb bgbpbZebabjmxlky mijZ\e_gby mklZgZ\eb\Zxsbf gZ rbg_ eh]bq_kdhc 140 d ghev kf

Qlh[u ]_g_jbjhWZ,lvhke_nhjfbjh\Zgby bfimevkZ \hkklZgmklehjhgky\h mijZ\e_gby rb ^he`ghlimklblv rbgmj_^_eZoµV Dh]^Z rbgZ hlimsdhZax) ih^ly]b\Zxsbc j_abklhj i_j_f_klbl mjh_gv gZ rbg_ d eh]bq_kdhc © ª.

Qlh[u ]_g_jbjhWZ,lvhke_ nhjfbjh\Zgby bfimevkZ \hkklZgmklehjhgky mijZ\e_gby rbg ^he`gh ijh^Zlev`m^_j`b\Zrlvgmjh^he`bl_evghklkv_x]h kehlZ \j_f_gb_g60µs).

DS18B20 ihke_ nhjfbjh\Zgby bfimevkZ \hkk\lZgh\e_gby \u[hjdm kbq]gZeZ µs \ l_q_gb_ hdgZ dhlhjh_ ijh^he`bl_evghklv µs, hlbgbpbZebabjh\Zgh ]eZ\gum mkljhckl\hf ?kebob gZ rbg_ \ukhdbc mjh_gv, \ukhdbc mjh_gv bkihevam_lky . ?kebob gZ rbg_ gbadbc mjh_gv, gbadbc hkms_kl\ey_lky aZibkv\ '6 % ? hkms_kl\ey_lky 0 \ DS18B20.

**Временные диаграммы слотов записи и чтения рис.** 14.

## СЛОТЫ ВРЕМЕНИ СЧИТЫВАНИЯ

Kehlu \j_f_gb kqblu\Zgby ij_^gZagZq_gu ^ey hij_^_e_gby '6 %hk%hygby`_mkljh i_j_^Zlv ^Zgghu_k\h_f khklhymklhjhckl\m mijZ\e_gby lhevdh dh]^Z mkljhckl\ nhjfbjm_lehklu \j_f_gb kqblu\Zgby ^ey hij_^_e_gby lZfybh@ beb dhfZg^u Ql_gby lblZgby >%mkl@hckl\h mijZ\e_gby ^he`gh ]_g_jbjh\Zlv kehlu \j_ff_g^e_gghkue\Zgby nhjfbjh\Zgbwlbodhfzg^wlh g_h[oh^bfh qlh[u '6 % fh] h[_kiu_qb^lZglgu[m_Dhjhf_ lh]h mkljhckl\h mijZ\efhg`bylh ]_g_jbjh\Zlv kehlu \j_f_gb kqblu\Zgbyfzg^hke_ Dhg_jlbjh\Z[4hy]h@ beb dhfZg^E2[B8h] qlh[u mahkZhklhygb_ hi_jZ^bh[tykg_gh \ jZa^_e_ DHF:G>U NMGDPB.B '6 %

<k_ kehlu\j_f_gb kqblu\Zgby ^he`gu [ulv fbgusfmbfhfZa^_eylvky bfimevkZ \hkklZgh\e_gbgybfmfhfµV f_`^m kehlZfb Kehl \j_f_gb kqblu\Zgby bgbpbZebab mkljhckl\mfklZgZ\ebgZ_rbg_ mjh_gv eh]bq_kdh]h gZmesybfagZbmfhifmkdZ_bgm kf beexkljZpbx lhke_ lhkljhckl\h mijZ\ebgbpbZebabjm_l kehl \j_f_gb kqblu '6 % gZqg_l i_j_^Z\Zlv beb gZ rbg_ '6 % i_j_^Z_l \ukhkdZ\emyhvgm i_j_^Z_l mklZgZ\eb\Zy gZ rbg_ <uoh^gu DS18B20 g^uhklhl_jgu q_15µs ihke_ hljbpZl_evghmjh\gy dhlhjuc bgbpbZebabjh\Ze kehl \j_f_gb kqblu\Zgb mijZ\e_g^bhye`_g \uimklblv rbgmgbZqaZZlv_kqblu\Zgb_ rbgu gus hjZgZqZeZ kehlZ

Beexkljzpby beexkljbjm_l TMNT, TRC TSAMPLE he`_g [ulv f_gvr_µs_^fey kehlZ \j_f_gb kqblu\Zgby lhdZau beexkljZpbb qlh kbkl_fZ jZkkqblu\ZxsZy khojZgTMNT bTRC ihqlb dZd \hafh`guc b hij_^_eyy f_kehZgb^lbgb\h]h \j_f_gb \ l_q_gb_ kehlh\ \j_f_gb kqblu\Zgusyi_jbdh^gpm

## CRC GENERATION

CRC bytes are provided as part of the DS18B20's 64-bit ROM code and in the 9th byte of the scratchpad memory. The ROM code CRC is calculated from the first 56 bits of the ROM code and is contained in the most significant byte of the ROM. The scratchpad CRC is calculated from the data stored in the scratchpad, and therefore it changes when the data in the scratchpad changes. The CRCs provide the bus master with a method of data validation when data is read from the DS18B20. To verify that data has been read correctly, the bus master must re-calculate the CRC from the received data and then compare this value to either the ROM code CRC (for ROM reads) or to the scratchpad CRC (for scratchpad reads). If the calculated CRC matches the read CRC, the data has been received error free. The comparison of CRC values and the decision to continue with an operation are determined entirely by the bus master. There is no circuitry inside the DS18B20 that prevents a command sequence from proceeding if the DS18B20 CRC (ROM or scratchpad) does not match the value generated by the bus master.

The equivalent polynomial function of the CRC (ROM or scratchpad) is:

CRC = X8 + X5 + X4 + 1

The bus master can re-calculate the CRC and compare it to the CRC values from the DS18B20 using the polynomial generator shown in Figure 9. This circuit consists of a shift register and XOR gates, and the shift register bits are initialized to 0. Starting with the least significant bit of the ROM code or the least significant bit of byte 0 in the scratchpad, one bit at a time should shifted into the shift register. After shifting in the 56th bit from the ROM or the most significant bit of byte 7 from the scratchpad, the polynomial generator will contain the re-calculated CRC. Next, the 8-bit ROM code or scratchpad CRC from the DS18B20 must be shifted into the circuit. At this point, if the re-calculated CRC was correct, the shift register will contain all 0s. Additional information about the Dallas 1-Wire cyclic redundancy check

DS18B20 is available in *Application Note 27: Understanding and Using Cyclic Redundancy Checks with Dallas Semiconductor Touch Memory Products*.

=_g_jbjh\Zgh_ PB_DEBQ?KDH=H DHGLJHEY BA;ULHQGHKLB

;Zclu pbdebq_kdh]h dhgljhey ba[ulhqghklb h[_ki_qbl\ky dZ^lZqZ^ 520 v'6 - % ¶

9-hf

b \ [Zcl_ k_johi_jZlb\ghc iZfylb Pbdebq_kdbc dhgljhe^Z ba[ulhqghklb h i_j\uo [blh\ dh^Z 520 b kh^_j`blky \ gZb[he__ agZqbl_evghf [Zcl_ 520 pbdebq_kdbc dhgljhev ba[ulhqghklb \uqbke_g hl ^Zgguo khojZg_gguo \ k\_jo baf_gy_lky dh]^Z ^Zggu_ \ k\_johi_jZlb\ghc Dhgljhev k ihfhsvx pbdebq_kdh]h dh^Z ij_^hklZ\ey_l mkljhckl\m mijZ\e_gby rbghc f_lh^ ijh\_jdb ijZ\bevghklb qblZxlky hl '6 % Qlh[u ijh\_jylv qlh ^Zggu_ qblZebkv ijZ\bevgh mkljhck ^he`ghhl\lhjgh \uqbkeblv pbdebq_kdbc dhgljhev ba[ulhqghklb hl ihemq_gguo ^ wlh agZq_gb_ k ex[uf pbdebq_kdbc dhgljhev ba[ulhqghklb dh^Z 520 ^e k_johi_jZlb\ghfm pbdebq_kdhfm dhgljhex ba[ulhqghklb ^ebyck_?kb_jZlb\guo pbdebq_kdbc dhgljhev ba[ulhqghklb khhl_lkl\m_l pbdebq_kdhfm dhgljhe ihemq_gguo ^Zggu_ [ueb k\h[h^gu_ hl hrb[hd KjZ\g_gb_ agZq_gbc pbdebq_kdh]h b j_r_gby ijh^he`Zlvky k hi_jZpb_c hij_^_e_gh iheghklvx mkljhckl\hf mijZ\e_g ko_fu \ '6 % dhlhjuc ij_iylkl\m_l ihke_^h\Zl_evghklb dhgljhev ba[ulhqghklb '6 % 520 beb k_johi_jZlb\guc g_ khhl_lk k]_g_jbjh\Zgghfm mkljhckl\hf mijZ\e_gby rbghc

Wd\b\Ze_glgZy ihebghfbZevgZy nmgdpby pbdebq_kdh]h dhgljhey ba[ k_johi_jZlb\guc

$$CRC = X^8 + X^5 + X^4 + 1$$

Mkljhckl\h mijZ\e_gby rbghc fh`_l ih\lhjgh \uqbkeblv pbdebq_kdbc dhgl
kjZ\gblv wlh kh agZq_gbyfb pbdebq_kdh]h dhgljhey ba[ulhqghklb hl '6 % b
]_g_jZlhj dhlhjhfm ihdZau\Zxl \ beexkljZpbb Wl Z\ k]h \h Z hk]h k]hkljZ ab XOR clkZ
b [blu k^\b]h\h]h j_]bkljZ bgbpbZebabjh\Zgu d KlZjl k gZbf_gvr_]h agZqZs
gZbf_gvr_]h agZqZs_]h [blZ HZ M Z h^bg \ [bl h^gh\j_f_ggh ^he`_g k^\bgmluc \
j_]bklj lhke_ kf_s_gbyf \[bl- hl 520 beb gZb[he__ agZqbl_evgh]h HA M [Zc
ihebghfbZevguc ]_g_jZlhj [m^_l kh^_j`Zlv i_j_jZkq_lguc pbdebq_kdbc dhgljhev
[blh\uc dh 520 beb k_johi_jZlb\guc pbdebq_kdbc dhgljhev ba[ulhqghklb hl '6
k^\bgmlu \ ko_fm < wlhf imgdl_ _keb i_j_jZkq_lguc pbdebq_kdbc dhgljhev b
k^\b]h\uc j_]bklj [m^_l kh^_j`Zlv _kv V >hihegbl_ e u gbZ ye bgbC jffZ pby gZclb
http://invent-systems.narod.ru/CRC.htm

DS18B20 OPERATION EXAMPLE 1

< wlhf ijbf_jbkihevam_lky g_kb 6 he%vdh V gZ rbg iZjZablguiblZgbf_ Mkljhckl\h
mijZ\e_gby rbghc bgbpbZebabjm_l l_fi_jZlmjgh_ ij_h[jZah\Zgb_ \ hij_^_e_g
qblZ_l HA M \uqbkey_l pbdebq_kdbc dhgljhev ba[ulhqghklb qlh[u ijh_jblv ^Zg

| MASTER MODE | DATA (LSB FIRST) | COMMENTS |
|---|---|---|
| TX | Reset | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l bfimevk k[jhk |
| RX | Presence | '6 % V hl_qZxl bfimevkhf ijbkmlkl\by |
| TX | 55h | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l dhfZg^m 520 Khhl_lkl\by |
| TX | 64-bit ROM code | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l dh^ 520 '6 % |
| TX | 44h | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l dhfZg^m &RQ |
| TX | DQ line held high by strong pullup | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l kbevgluc d kihkh[ghfm d ]em[hdhc \uly`d_ ^ey ijh^he`bl_e ij_h[jZah\Zgby rbghc). |
| TX | Reset | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l bfimevk k[jhkZ |
| RX | Presence | '6 % V hl_qZxl bfimevkhf ijbkmlkl\by |
| TX | 55h | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l dhfZg^m 520 Khhl_lkl\by |
| TX | 64-bit ROM code | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l dh^ 520 '6 % |
| TX | BEh | Mkljhckl\h mijZ\e_gby rbghc mkdZ_l dhfZg^m 5HD Scratchpad. qblZlZlv lZfylv |
| RX | 9 data bytes | =eZ\gh_ mkljhckl\h mijZ\e_gby rbghc mkdZ_l\k_ j_]bklju \dexqZy k_johi_jZlb\guc pbdebq_kdbc dhgljhev ba[u =eZ\gh_ mkljhckl\h mijZ\e_gby rbghc mkdZ_l\kl\bkey_l pbdebq_kdbc dhgl ba[ulhqghklb **первых восьми байтов данных** b kjZ\gb\Z_l jZkq_lguc pbdebq_kdbc dh ba[ulhqghklb k pbdebq_kdbf dhgljhe_f ba[u ql_gby [Zcl ?keb hgb khhjlb_l k\Zmxguo kqblZ_lky mki_rguf=l gZ ql_hjy_l pbde ql_ |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DS18B20 OPERATION EXAMPLE 2

< wlhf ijbf_jb_kihevam_lhkeyvdh h^bg '6 % gZk rbZgj_Zablguhf lZgbf._ Mkljhckl\h
mijZ\e_gby ihku^ZZgbu (TH, TL, and config) dj_]bkljZf dhgnb]mjZ\ZAbb '6 % aZZ1_f qblZ_l
HAM1h\lhjgh \uqbkpbyd ebq_kdbc dhgljhev ba[ulhqghklb qlhu_ ijZe_jblm^\Zhgkl\h
mijZ\e_gdbyibjm_l kh^_j`ZAgM_EEPROM.

| MASTER MODE | DATA (LSB FIRST) | COMMENTS |
|---|---|---|
| TX | Reset | Master issues reset pulse. |
| RX | Presence | DS18B20 responds with presence pulse. |
| TX | CCh | Master issues Skip ROM command. |
| TX | 4Eh | Master issues Write Scratchpad command. |
| TX | 3 data bytes | Master sends three data bytes to scratchpad (TH, TL, and config). |
| TX | Reset | Master issues reset pulse. |
| RX | Presence | DS18B20 responds with presence pulse. |
| TX | CCh | Master issues Skip ROM command. |
| TX | BEh | Master issues Read Scratchpad command. |
| RX | 9 data bytes | Master reads entire scratchpad including CRC. The master then recalculates the CRC of the first eight data bytes from the scratchpad and compares the calculated CRC with the read CRC (byte 9). If they match, the master continues; if not, the read operation is repeated. |
| TX | Reset | Master issues reset pulse. |
| RX | Presence | DS18B20 responds with presence pulse. |
| TX | CCh | Master issues Skip ROM command. |
| TX | 48h | Master issues Copy Scratchpad command. |
| TX | DQ line held high by strong pullup | Master applies strong pullup to DQ for at least 10ms while copy operation is in progress. |

***Приложение.***

Ijbf_jih^ijh]jZffgZZkk_f[e_j_ey k_jhbc b lZdlh\hc f=p ih^jZamf_\Z_lky bkihe
\gmlj_gg_]h ]_g_jZ\hjZZ ijh]jZffZ ijb_\u_rgZ^ey ql_gby ^\mo [Zcl l_fi_jZlmju [_a
^hklh_jghklb ^Zgguo

```
;=============================================================================
; DOUT_LOW   WlZ ih^ijh]jZffZ mklZgZ\eb\Z_l ebgbx >:EE:KKZ gZ \u\h^"0" mklZgZ
DOUT_LOW
                bcf         DALLAS                  mklZgh\blv gbadbc mjh\_gv gZ
                bsf         STATUS,RP0              \u[jZlv [Zgd
                bcf         TRISDAL,LINE            gZkljhblv ihjl gZ \uoh^
                bcf         STATUS,RP0              \u[jZlv [Zgd
                nop                                 ;
                nop                                 ;
          retlw .0                                  ;
;=============================================================================
```

***Примечание: обратите особое внимание на формирование импульса восстановления DOUT_HIGH, это так называемый «Активный» импульс восстановления, когда на стандартное заданное время в линию для восстановления уровня закачивается ток с порта контроллера. Этот эффект позволяет значительно улучшить фронт сигнала. Формирование фронтов таким образом - это гарантия работы на удаленные датчики!!!***

```
;=============================================================================
 '287B+,*+  WlZ ih^ijh]jZffZ mklZgZ\eb\Z_l ebgbx >:EE:KKZ dZd \\h^  ijh^Z\eb
mjh\g_f rbgm
 Z aZl_f_i\hj^bl ebgbx gZ ijb_f \g_rgbc j_abklhj m^_j`b\Z_l \ukhdbc mjh\_gv
```

```
DOUT_HIGH
                bsf     DALLAS              aZ^_j`dZ ^ey ^ebgguo ebgbc ^ey
            ;   nop                         nhjfbjh\Zgby bfimevkZ \hkklZgh\e_gby
            ;   nop                       ;(gZ hq_gv ^ebgguo
            ;   nop                       ;
            ;   nop                       ;
                bsf     STATUS,RP0        ; \u[jZlv[Zgd
                bsf     TRISDAL,LINE        gZkljhblv ihjl gZ \\h^  bfblZpby hldjulh]h
dhee_dlhjZ
                bcf     STATUS,RP0        ; \u[jZlv[Zgd
            retlw   .0                    ;
;==============================================================================

;==============================================================================
  '/,7B:5  WlZ ih^ijh]jZffZ bkihevam_lky \ oh^_ jZ[hlu ih^ijh]jZff k\yab
  aZ^_j`dZ    PNV  \ dhlhjZy g_h[oh^bfZ '6     ^ey ql_gby beb aZibkb [blZ ^Zgg
DLIT_WR                                   ;
                movlw   .20               ;.20 - 60mks
                movwf   TEMP0             ;
                decfsz  TEMP0,F           ;
                goto    $-.1              ;
            retlw   H'00'                 ;
;==============================================================================

;==============================================================================
; DRECEIVE   WlZ ih^ijh]jZffZ ihemqZ_l ^Zggu_ hl >:EE:KKDH=H qbiZ
DRECEIVE
                movlw   H'08'                   Dhebq_kl\h ihemqZ_fuo [bl
                movwf   TEMP1                   AZ]jmadZ j_]bkl\jZZ kq_lq
C_DRECEIVE      call    DOUT_LOW                klZjl ql_gby [blZ mklZgh\blv gbadbc
                call    DOUT_HIGH               gZqZlv ql_gb_
                btfss   DALLAS                  ijh\_jblv mjh\_gv gZ ebgbb DALLAS1

                bcf     STATUS,C                mklZgh\blv K \
                btfsc   DALLAS                  ijh\_jblv mjh\_gv gZ ebgbb DALLAS1

                bsf     STATUS,C                g_l mklZgh\blv K \
                rrf     COM_REG,F               k^\b] \ijZ\h ^ey aZibkb \ j_]bkl\jZ COM
                call    DLIT_WR                 h`b^Zlv ^ey hdhgqZgby nhjfbjh\Zgb_
^ZeeZkhf [blZ
                decfsz  TEMP1,F           ;
                goto    C_DRECEIVE        ;
            retlw   H'00'                 ;
;==============================================================================

;==============================================================================
; DSEND   WlZ ih^ijh]jZffZ ihkueZ_l DS1820 ^uZggu_
  ihkueZ_lky feZ^rbf [blhf kgZqZeZ [_a q_lghklb  hklZgh\Z  beb [blh\ gZqZeZ
DSEND
                movwf   COM_REG         AZ]jmadZ [hn_jZ dhfZg^ ^ey i_j_kuedb
                movlw   H'08'           Dhebq_kl\h [blh\ ^ey i_j_kuedb
                movwf   TEMP1       ;
C_DSEND         call    DOUT_LOW    ; Start the write slot
                rrf     COM_REG,F       K^\b] \ijZ\h  qlh[u hij_^_eblv q_j_a[bl^ey i_j\u
i_j_kuedb
                btfss   STATUS,C        Kfhlj_lv [bl K
            goto    SEND0           ;
                call    DOUT_HIGH       MklZgh\blv ebgbx \     _keb [bl K
            goto    DS_1            ;
SEND0           call    DOUT_LOW        MklZgh\blv ebgbx \     _keb [bl K
```

```
DS_1        call    DLIT_WR         H`b^ZlvS  qlh[u ihaehblv DS18B20 ihegblv \u[hjdm
            call    DOUT_HIGH       MklZgh\blv rbgm \
            decfsz  TEMP1,F         Mf_gvrblv kq_lqbd i_j_^Zgguo [blh\ b ijh\_jblv
eb ghev
            goto    C_DSEND         lh\lhjblv i_j_^Zqm [blZ
        retlw H'00'                 ;
;==========================================================================================
```

***Пример описания портов для подключения DS18B20.***

```
;==========================================================================================
  hibkbZg ihjlh\ ih^dexq_gby ^ZlqbdZ
#define     TRISDAL     TRISA       j_]bklj mijZ\e_gby ihjlZ >:EE:K:
#define     PORTDAL     PORTA       j_]bklj ^Zgguo ihjlZ >:EE:K:
#define     LINE        3           ebgby ihjlZ >:EE:K:
#define     DALLAS      PORTA,3     rbgZ k\yab k >:EE:KHF
;==========================================================================================
```

***Для разработчиков - обратите внимание, что если вы заставляете DS18B20 непрерывно конвертировать температуру, то чип будет разогреваться, и отклонение может составлять до 0,5 С. Это особенно ощутимо в средах с малой конвенцией. Т.е. чем реже вы заставляете его конвертировать, тем точнее температура измерения.***