

TPC10 SERIES CMOS FIELD-PROGRAMMABLE GATE ARRAYS

SRFS001F - D3864, DECEMBER 1989 - REVISED FEBRUARY 1993

timing derating

Operating temperature, operating voltage, and device processing conditions, along with product revision and speed grade, account for variations in array timing characteristics. These variations are summarized in derating factors for TPC10 array typical timing specifications. The derating factors as shown in Table 4 are based on the recommended operating conditions for TPC10 commercial, industrial, and military applications.

For estimating performance, the delay factors may be used in conjunction with the delay values shown in the typical switching characteristics tables. Temperature and voltage variations are measured according to the curves in the graphs shown in Figure 6 and Figure 7. The ALS timing analyzer can be used to provide actual postlayout timing specifications for each circuit implementation.

Table 4. Timing Derating Factor (x typical) (see Note 9)

TPC1010A, TPC1020A TPC1010B, TPC1020B	C SUFFIX		I SUFFIX		M SUFFIX	
	BEST CASE	WORST CASE	BEST CASE	WORST CASE	BEST CASE	WORST CASE
Standard speed	0.45	1.54	0.40	1.65	0.37	1.79
-1 Speed grade	0.45	1.28	0.40	1.37	0.37	1.49
-2 Speed grade†	0.45	1.13	0.40	1.20	0.37	1.32

† Applies to TPC1010B and TPC1020B only

NOTE 9: Best case reflects maximum operating voltage, minimum operating temperature, and best case processing. Worst case reflects minimum operating voltage, maximum operating temperature, and worst case processing. Best case derating is based on sample data only and is not guaranteed.

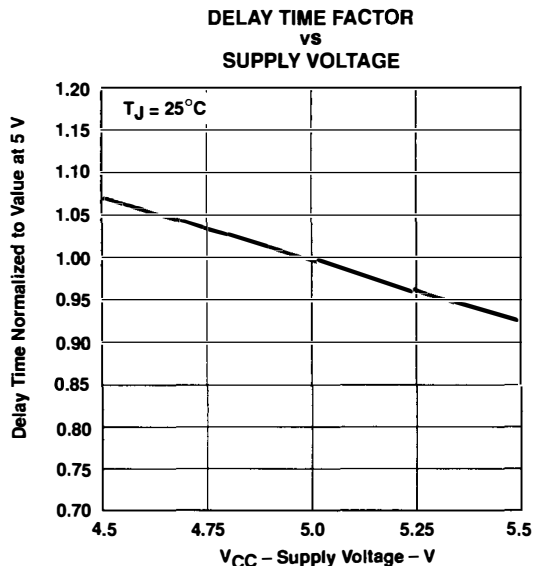


Figure 6

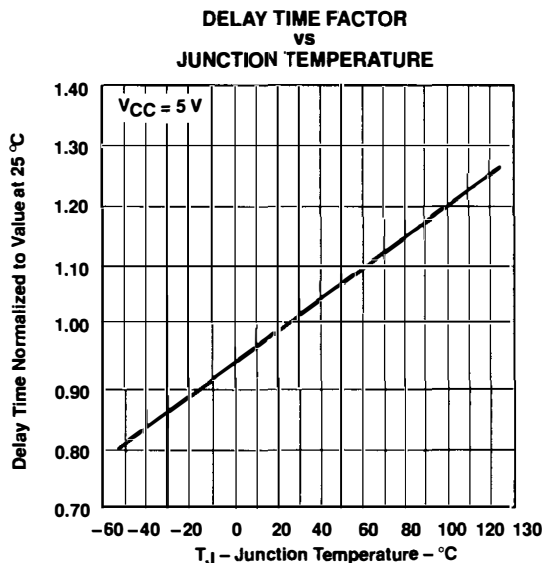


Figure 7

BQ29410DCTR pb-FREE	23480	新环保批次	
BQ20895DBTR pb-FREE	23480	新环保批次	
BQ29412DCTR pb-FREE	23480	新环保批次	
BQ2060A-E619DBQR pb-FF	23480	新环保批次	
BQ25872	23480	新环保批次	BGA
BQ25601RTWP	23480	新环保批次	QFN
BQ2024LPRE3	23480	新环保批次	TO-92
BQ20275DBTRV160	23480	新环保批次	
BQ2050HSN-A510	23480	新环保批次	SOP-16
BQ2050HSN-A510TRG4	23480	新环保批次	SOP-16
BQ2570XA	23480	新环保批次	QFN
OES	23480	新环保批次	QFN
TMM2068D-35	23480	新环保批次	DIP20
TPA23100D2PHPR	23480	新环保批次	QFP-48
BQ29312PM	23480	新环保批次	TSSOP
BQ2003SN	23480	新环保批次	SOP16
AAM26C31MWB	23480	新环保批次	SOP
BQ24316DSGR-G4	23480	新环保批次	
UCC37321DGN	23480	新环保批次	MSOP
UCC37323DR-UCC37323D	23480	新环保批次	SOP8
UCC37324P-37324	23480	新环保批次	DIP8
UCC37325DRG4	23480	新环保批次	SOP8
UCC37321 . . .	23480	新环保批次	
UCC37322 . . .	23480	新环保批次	
UCC37324DGNRG4	23480	新环保批次	MSOP8
UCC37323PE4	23480	新环保批次	DIP8
UCC37322	23480	新环保批次	SOP8
BQ25870YFFR	23480	新环保批次	
UCC37321PE4	23480	新环保批次	AN
UCC37324PE4	23480	新环保批次	Tube
UCC37324DG4	23480	新环保批次	Tube
BQ27320EVM-766	23480	新环保批次	模块
.....	新环保批次	

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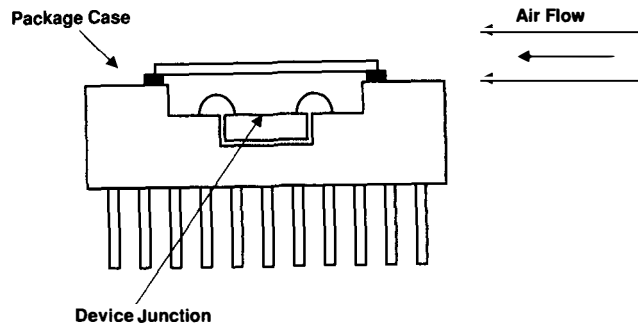
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package thermal characteristics

The device junction to case thermal characteristic is $R_{\theta JC}$, and the junction to ambient air characteristic is $R_{\theta JA}$. The thermal characteristics for $R_{\theta JA}$ are shown with two different air-flow rates. Maximum junction temperature is 150°C for short durations. However, a maximum junction temperature of 140°C is recommended for continuing operation. A sample calculation of the maximum power dissipation for a PLCC 84-pin package at commercial temperature is as follows:

$$\frac{\text{Max. junction temp. (}^\circ\text{C)} - \text{Max. commercial temp. (}^\circ\text{C)}}{R_{\theta JA} \text{ (}^\circ\text{C/W)}} = \frac{150^\circ\text{C} - 70^\circ\text{C}}{40^\circ\text{C/W}} = 2 \text{ W}$$

PACKAGE TYPE	PIN COUNT	$R_{\theta JC}$	$R_{\theta JA}$ STILL AIR	$R_{\theta JA}$ 300 FT/MIN	UNIT
Ceramic Pin Grid Array (CPGA)	84	3.5	48	NA	$^\circ\text{C/W}$
Ceramic Quad Flat Package (CQFP)	84	3.5	75	NA	$^\circ\text{C/W}$
Plastic Leaded Chip Carrier PLCC	44	13	65	41	$^\circ\text{C/W}$
	68	13	50	32	
	84	10	40	27	
Plastic Quad Flat Package (PQFP)	100	10	60	38	$^\circ\text{C/W}$



BQ2003SN	23480	新环保批次	SOP16
AAM26C31MWB	23480	新环保批次	SOP
BQ24316DSGR-G4	23480	新环保批次	
UCC37321DGN	23480	新环保批次	MSOP
UCC37323DR-UCC37323D	23480	新环保批次	SOP8
UCC37324P-37324	23480	新环保批次	DIP8
UCC37325DRG4	23480	新环保批次	SOP8
UCC37321...	23480	新环保批次	
UCC37322...	23480	新环保批次	
UCC37324DGNRG4	23480	新环保批次	MSOP8
UCC37323PE4	23480	新环保批次	DIP8
UCC37322	23480	新环保批次	SOP8
BQ25870YFFR	23480	新环保批次	
UCC37321PE4	23480	新环保批次	AN
UCC37324PE4	23480	新环保批次	Tube
UCC37324DG4	23480	新环保批次	Tube
BQ27320EVM-766	23480	新环保批次	模块
UCC37325DGNRG4	23480	新环保批次	na
UCC37322QDRQ1	23480	新环保批次	SOP8
UCC37322IDRG4	23480	新环保批次	SOP8
UCC37325DG4	23480	新环保批次	SOP
UCC37324	23480	新环保批次	SOP
ucc37323DGNRG4	23480	新环保批次	MOP8
BQ29310PWPRG4	23480	新环保批次	TSSOP24
UCC37324DGNRG4	23480	新环保批次	SMD
UCC37322DG4	23480	新环保批次	SOP8
UCC37322DR	23480	新环保批次	SOP8
UCC37322DGNRG4	23480	新环保批次	MSOP8
BQ20317EMT20W-A5	23480	新环保批次	
BQ2751DRZ	23480	新环保批次	DFN
UCC37324DR TEL	23480	新环保批次	MSOP8
UCC37324DGNR TEL	23480	新环保批次	MSOP8