POWER CONSIDERATIONS

The average chip-junction temperature, T_J, in °C can be obtained from:

$$T_J = T_A + (P_D \bullet \theta_{JA}) \quad (1)$$

Where:

$T_A \equiv$ Ambient Temperature, °C

$\theta_{JA} \equiv$ Package Thermal Resistance, Junction-to-Ambient, °C/W

$P_D \equiv P_{INT} + P_{PORT}$

$P_{INT} \equiv I_{CC} \times V_{CC}$, Watts — Chip Internal Power

$P_{PORT} \equiv$ Port Power Dissipation, Watts — User Determined

For most applications $P_{PORT} \ll P_{INT}$ and can be neglected. P_{PORT} may become significant if the device is configured to drive Darlington bases or sink LED loads.

An approximate relationship between P_D and T_J (if P_{PORT} is neglected) is:

$$P_D = K \div (T_J + 273°C) \quad (2)$$

Solving equations 1 and 2 for K gives:

$$K = P_D \bullet (T_A + 273°C) + \theta_{JA} \bullet P_D^2 \quad (3)$$

Where K is a constant pertaining to the particular part. K can be determined from equation 3 by measuring P_D (at equilibrium) for a known T_A. Using this value of K the values of P_D and T_J can be obtained by solving equations (1) and (2) iteratively for any value of T_A.

DC ELECTRICAL CHARACTERISTICS (V_{CC} = 5.0 Vdc ±5%, V_{SS} = 0, T_A = 0°C to 70°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Input High Voltage	E	V_{EIH}	V_{CC} – 0.75		V_{CC}	V
Input Low Voltage	E	V_{EIL}	V_{SS} – 0.3		V_{SS} + 0.6	V
Input High Voltage	$\overline{RESET}$	V_{IH}	V_{SS} + 4.0		V_{CC}	V
	Other Inputs*		V_{SS} + 2.0		V_{CC}	
Input Low Voltage	All Inputs*	V_{IL}	V_{SS} – 0.3		V_{SS} + 0.8	V
Input Leakage Current (V_{in} = 0 to 5.25 V)	$\overline{HALT}$, AS, $\overline{NMI}$, $\overline{IRQ1}$, $\overline{RESET}$	I_{in}		1.5	2.5	μA
Hi Z Input Current (V_{in} = 0.5 to 2.4 V)	P10-P17, P20-P24, P30-P37	$\lvert I_{TSI} \rvert$	–	2.0	10	μA
Output High Voltage (I_{load} = –100 μA, V_{CC} = min)	All Outputs	V_{OH}	V_{SS} + 2.4			V
Output Low Voltage (I_{load} = 2.0 mA, V_{CC} = min)	All Outputs	V_{OL}	–		V_{SS} + 0.5	V
Darlington Drive Current (V_O = 1.5 V)	P10-P17	I_{OH}	1.0	1.5	5.0	mA
Internal Power Dissipation (Measured at T_A = 0°C in Steady-State Operation)		P_{INT}	–		1200	mW
Input Capacitance (V_{in} = 0, T_A = 25°C, f_o = 1.0 MHz)	P30-P37, AS	C_{in}	–		12.5	pF
	Other Inputs (Except E)		–		10.0	
V_{CC} Standby	Power Down	V_{SBB}	4.0		5.25	V
	Power Up	V_{SB}	4.75		5.25	
Standby Current	Power Down	I_{SBB}	–		6.0	mA

*Except mode programming levels; see Figure 8.