

Reliability qualification information

Stress	Conditions	Duration	Quantity	Rejects
Stress Pre and Post stress electrical test	$T_{amb} = 25^{\circ}\text{C}$	N/A	All parts	See below
PC Preconditioning	JESD22-A113 Bake $T_{amb} = 125^{\circ}\text{C}$ Soak $T_{amb} = 85^{\circ}\text{C}$, RH = 85% reflow	24 hours 168 hours 3 cycles	693	0
HTRB High temperature reverse bias	MIL-STD-750-1 $T_j = T_j \text{ max}$, $V_{DS} = 80\%$ of rated Voltage M1039 Method A	1000 hours	231	0
HTGB High temperature gate bias	JESD22-A108 $T_j = T_j \text{ max}$, $V_{GS} = 20\text{V(SL)}$, 16V (LL)	1000 hours	231	0
TC Temperature Cycling	JESD22-A104 -55°C to 150°C	500 cycles	231	0
UHAST Unbiased highly accelerated stress test	JESD22-A118 $T_{amb} = 130^{\circ}\text{C}$, RH = 85% Pressure = +2.27atm	96 hours	231	0
HAST* Highly accelerated stress test	JESD22-A110 $T_{amb} = 130^{\circ}\text{C}$, RH = 85% $V_{DS} = 80\%$ of rated voltage	96 hours	231	0
H3TRB* Temperature Humidity bias	JESD22-A101 $T_{amb} = 85^{\circ}\text{C}$, RH = 85% $V_{DS} = 80\%$ of rated voltage	1000 hours		
IOL Intermittent operating life	MIL-STD-750 method 1037 $\Delta T_j = 80^{\circ}\text{C}$	5000 cycles	231	0
RSH Resistance to solder heat	JESD22-A111 (SMD) $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$	10s	30	0
SD Solderability	IPC/ECA J-STD-002 Method A dip and look No aging, solder $T_a = 245^{\circ}\text{C}$	3 sec dip	66	0
	IPC/ECA J-STD-002 Method B dip and look No aging Solder $T_a = 245^{\circ}\text{C}$ >95% lead coverage required Steam Aging: condition C Steam $T_a = 93^{\circ}\text{C}$, 8 hours Solder $T_a = 245^{\circ}\text{C}$, 3 sec dip	8 hours 3 sec dip	66	0
	Dry Bake: $T_a = 150^{\circ}\text{C}$ Solder $T_a = 245^{\circ}\text{C}$ >95% lead coverage required	16 hours 3 sec dip	66	0

*Either HAST or HT3RB are tested for a set of devices.

Calculation of FIT and MTBF

Test considered for FIT calculation: High Temperature Reverse Bias (HTRB) and High temperature Gate Bias (HTGB). Confidence level 60%, derated to 55°C , activation energy 0.7eV test time 168 to 1000 hours.

Technology	Quantity	Failure rate	MTBF
T7	462	2.6	3.83E+8