

P-Channel Enhancement Mode MOSFET

TDM2301S

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		Rating	Unit
VDSS	Drain-Source Voltage		-20	V
VGSS	Gate-Source Voltage		± 12	
ID*	Continuous Drain Current		-1.5	A
IDM*	300 μs Pulsed Drain Current	VGS=-4.5V	-6	
IS*	Diode Continuous Forward Current		-1	A
TJ	Maximum Junction Temperature		150	$^\circ\text{C}$
TSTG	Storage Temperature Range		-55 to 150	
PD*	Maximum Power Dissipation	TA=25 $^\circ\text{C}$	0.83	W
		TA=100 $^\circ\text{C}$	0.3	
R θ JA*	Thermal Resistance-Junction to Ambient		150	$^\circ\text{C}/\text{W}$

Note: *Surface Mounted on 1in² pad area, t \leq 10sec.

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	TDM2301S			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250 μA	-20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-16V, V _{GS} =0V T _J =85 $^\circ\text{C}$			-1 -30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250 μA	-0.5	-0.6	-1	V
I _{GSS}	Gate Leakage Current	V _{GS} = $\pm 12\text{V}$, V _{DS} =0V			± 100	nA
R _{DS(ON) a}	Drain-Source On-state Resistance	V _{GS} =-4.5V, I _{DS} =-1.5A		130	170	m Ω
		V _{GS} =-2.5V, I _{DS} =-0.6A		170	220	
V _{SD a}	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V		-0.7	-1.3	V
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =-10V, V _{GS} =-4.5V, I _{DS} =-1A		5	7	
Q _{gs}	Gate-Source Charge			1.3		nC
Q _{gd}	Gate-Drain Charge			1.3		

Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	TDM2301S			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics^b						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		12		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=-15V,$ Frequency=1.0MHz		350		PF
C_{oss}	Output Capacitance			75		
C_{rss}	Reverse Transfer Capacitance			55		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-10V, R_L=10\Omega,$ $I_{DS}=-1A, V_{GEN}=-4.5V,$ $R_G=6\Omega$		6	10	Ns
T_r	Turn-on Rise Time			8	12	
$t_{d(OFF)}$	Turn-off Delay Time			25	45	
T_f	Turn-off Fall Time			20	36	

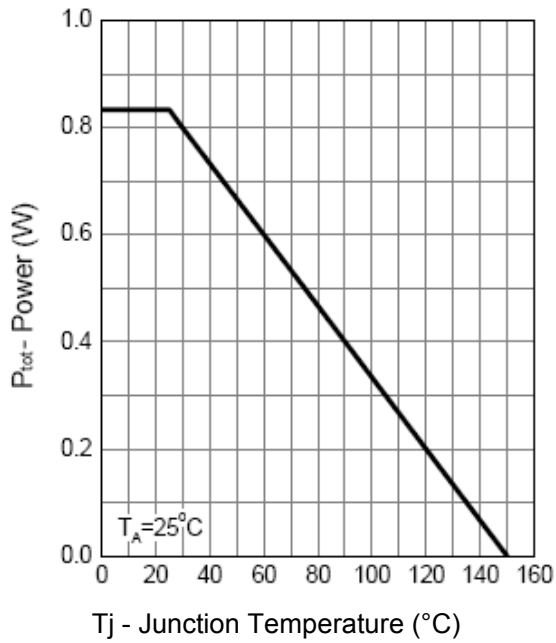
Notes:

a : Pulse test ; pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

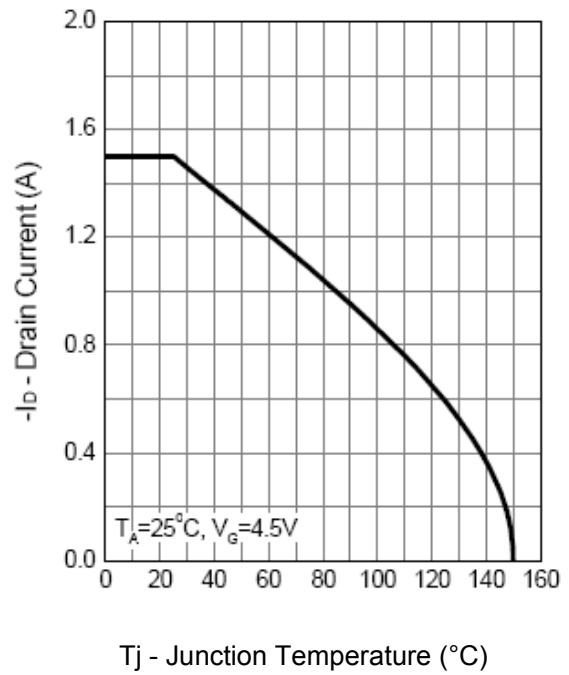
b : Guaranteed by design, not subject to production testing.

Typical Characteristics

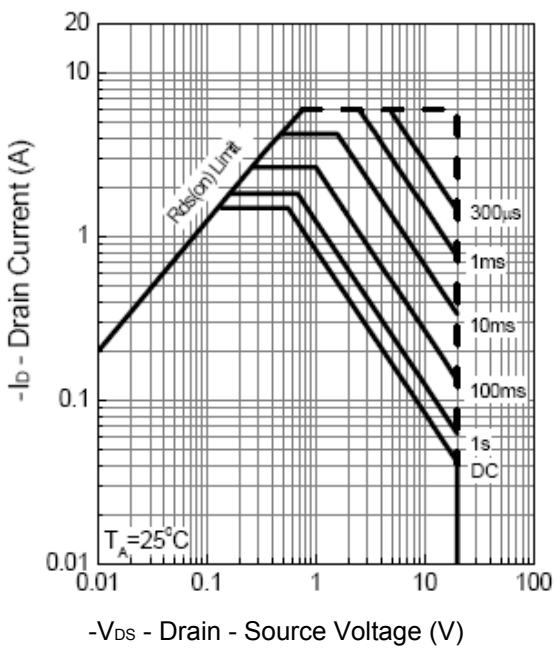
Power Dissipation



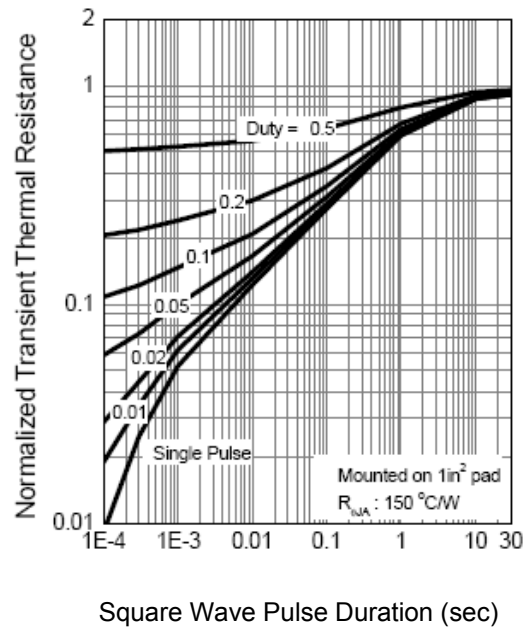
Drain Current



Safe Operation Area

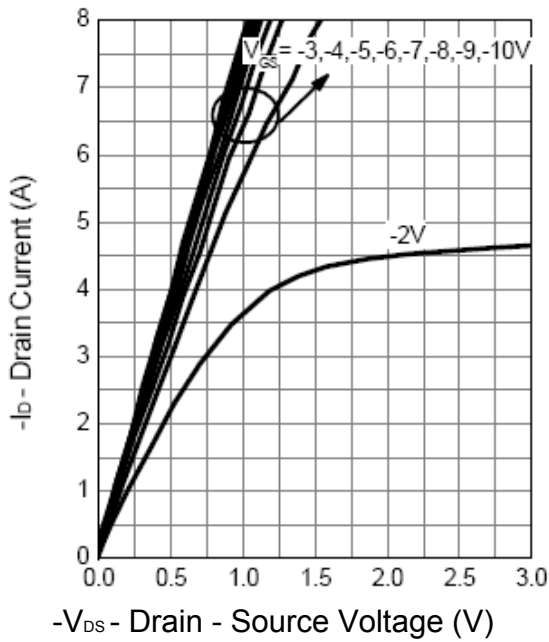


Thermal Transient Impedance

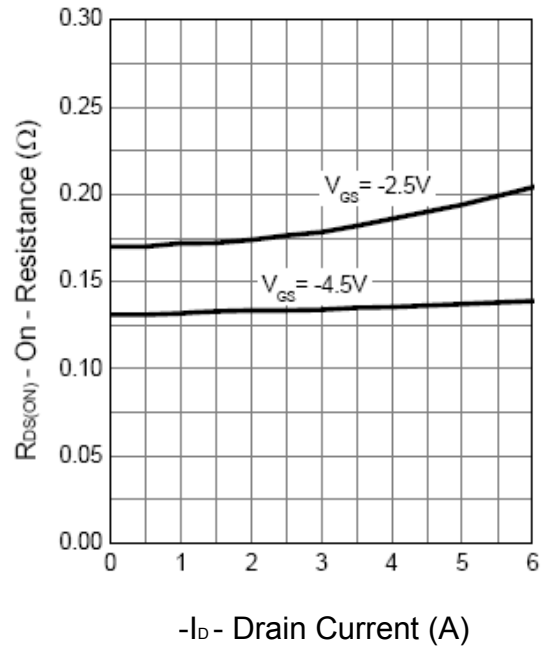


Typical Characteristics (Cont.)

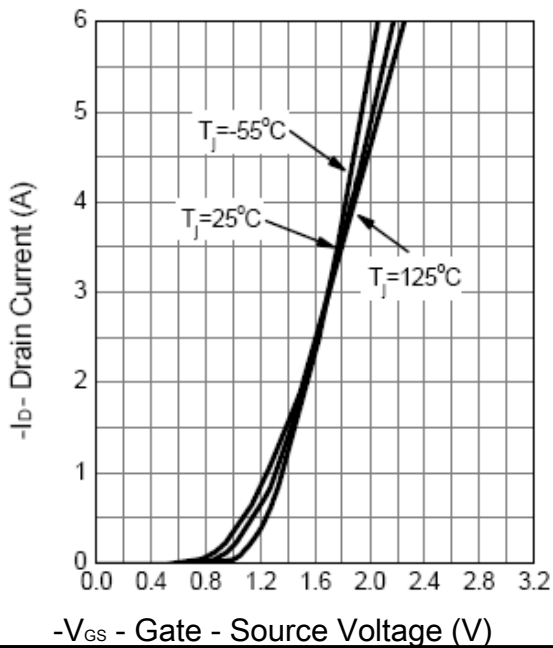
Output Characteristics



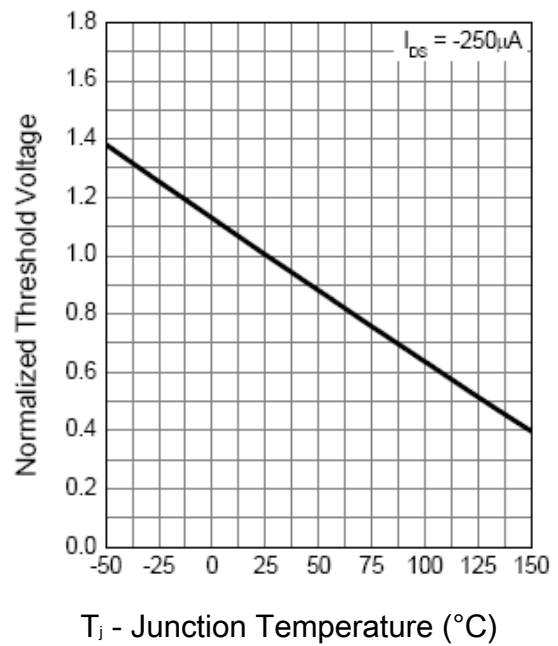
Drain-Source On Resistance



Transfer Characteristics

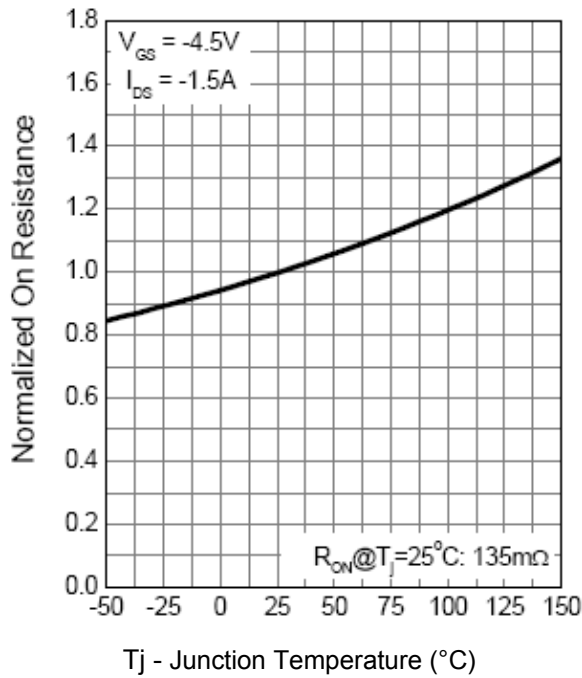


Gate Threshold Voltage

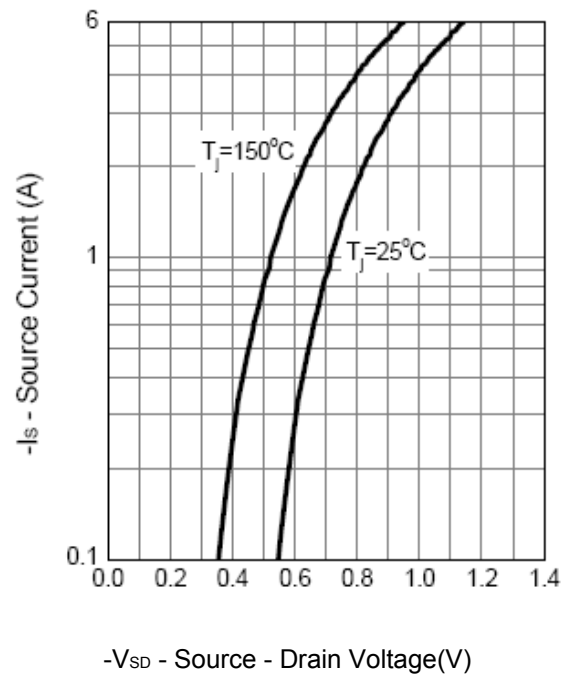


Typical Characteristics (Cont.)

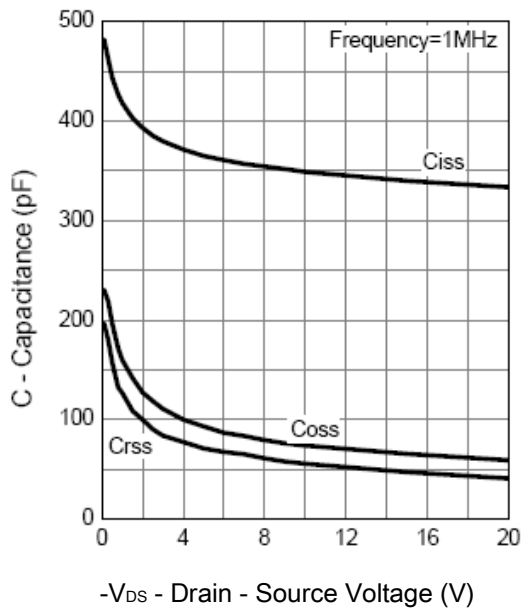
Drain-Source On Resistance



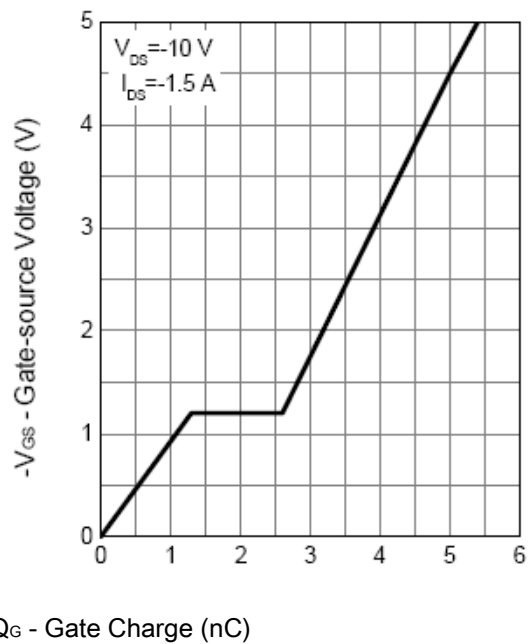
Source-Drain Diode Forward



Capacitance

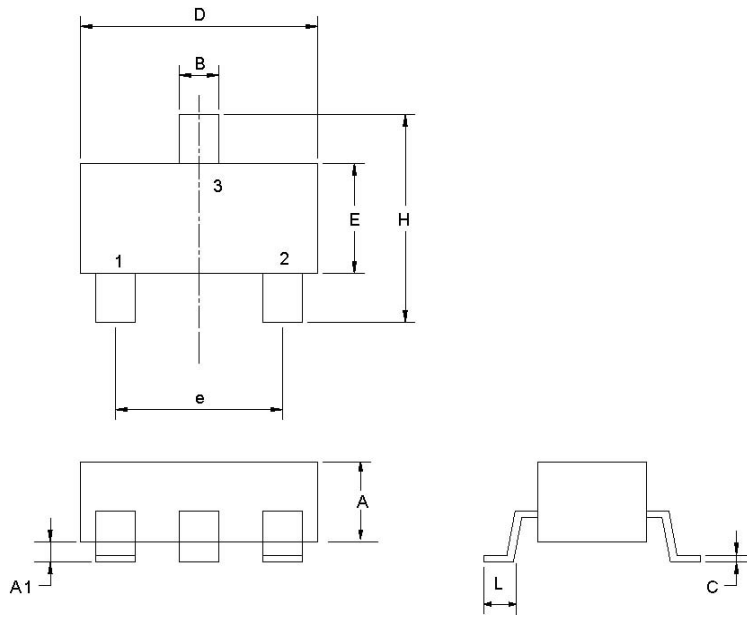


Gate Charge



Packaging Information

SOT23-3L

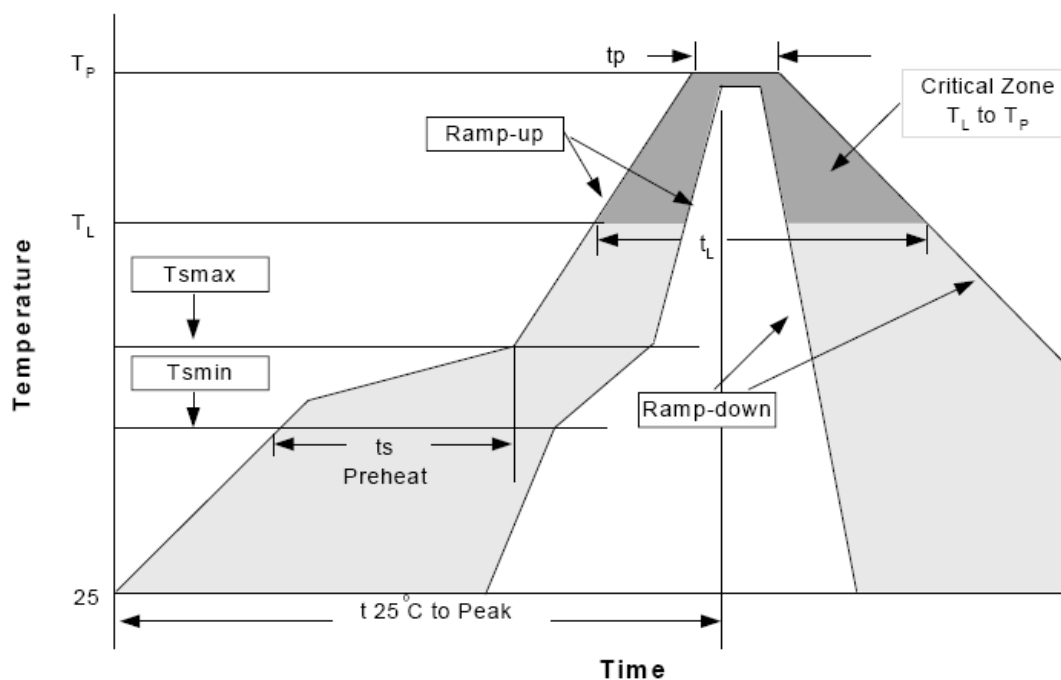


Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
B	0.35	0.51	0.014	0.020
C	0.10	0.25	0.004	0.010
D	2.70	3.10	0.106	0.122
E	1.40	1.80	0.055	0.071
e	1.90/2.1 BSC.		0.075/0.083 BSC.	
H	2.40	3.00	0.094	0.118
L	0.37		0.015	

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb), 100%Sn
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)



Classification Reflow Profiles

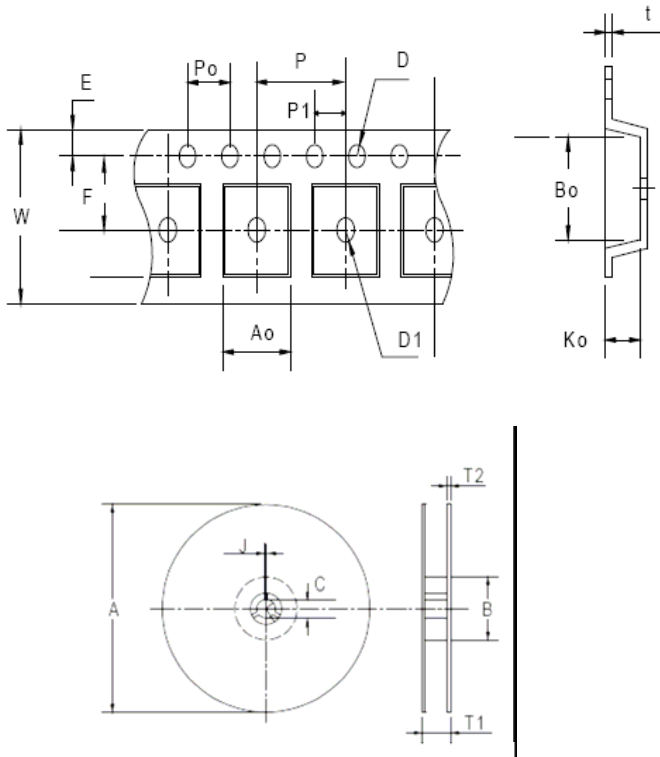
Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (TL to TP)	3°C/second max.		3°C/second max.	
Preheat	100°C		150°C	
Temperature Min (T _{min})	150°C		200°C	
Temperature Max (T _{max})	60-120 seconds		60-180 seconds	
Time (min to max) (t _s)	183°C		217°C	
Time maintained above:	60-150 seconds		60-150 seconds	
Temperature (T _L)	225+0/-5°C		240+0/-5°C	245+0/-5°C
Time (t _L)	10-30 seconds		20-40 seconds	
Peak/Classification Temperature (T _p)	6°C/second max		6°C/second max	
Time within 5°C of actual Peak Temperature (t _p)	6 minutes max		8 minutes max	
Ramp-down Rate				
Time 25°C to Peak Temperature				

Notes: All temperatures refer to topside of the package .Measured on the body surface.

Reliability Test Program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C, 5 SEC
HOLT	MIL-STD 883D-1005.7	1000 Hrs Bias @ 125°C
PCT	JESD-22-B, A102	168 Hrs, 100% RH, 121°C
TST	MIL-STD 883D-1011.9	-65°C ~ 150°C, 200 Cycles

Carrier Tape & Reel Dimensions



Application	A	B	C	J	T1	T2	W	P	E
SOT23-3L	178±1	60 ± 1.0	12.0	2.5 ± 0.15	9.0 ± 0.5	1.4	8.0+ 0.3 - 0.3	4.0	1.75
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	3.5 ± 0.05	1.5 +0.1	0.1MIN	4.0	2.0 ± 0.05	3.1	3.0	1.3	0.2±0.03

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOT 23-3L	8	5.3	3000