P-Channel Enhancement Mode MOSFET TDM3415S

Features

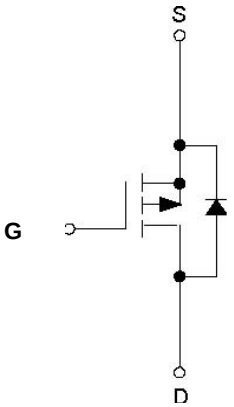
- -20V/-1.5A ,
  $R_{DS(ON)}$=130mΩ(typ.) @ V_{GS}=-4.5V
  $R_{DS(ON)}$=170mΩ(typ.) @ V_{GS}=-2.5V
- Super High Dense Cell Design
- Reliable and Rugged
- Lead Free Available (RoHS Compliant)

Applications

- Power Management in Notebook Computer , Portable Equipment and Battery Powered Systems.

Pin Description

Top View of SOT23-3L



P-Channel MOSFET

Ordering and Marking Information

TDM3415S□ □ -□ □ □ Lead Free Code Handing Code Temp. Range Packge Code	Packge Code A: SOT23-3L Operating Junction Temp. Rang C: -55 to 150°C Handing Code TU:Tube TR:Tape & Reel Lead Free Code: L:Lead Free Device Blank:Original Device
TDM3415S M23 X	X:Date Code

Note: TECHCODE lead-free products contain molding compounds/die attach materials and 100% matte in plate termination finish; which are fully compliant with RoHS and compatible with both SnPb and lead-free soldiering operations. TECHCODE lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J STD-020C for MSL classification at lead-free peak reflow temperature.

Absolute Maximum Ratings (T_A = 25°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*	300μs Pulsed Drain Current	VGS=-4.5V	-6	
IS*	Diode Continuous Forward Current		-1	A
TJ	Maximum Junction Temperature		150	°C
TSTG	Storage Temperature Range		-55 to 150	
PD*	Maximum Power Dissipation	TA=25°C	0.83	W
		TA=100°C	0.3	
RθJA*	Thermal Resistance-Junction to Ambient		150	°C/W

Note: *Surface Mounted on 1in^2 pad area, t ≤ 10sec.

Electrical Characteristics (T_A = 25°C unless otherwise noted)

			TDM3415S			
Symbol	**Parameter**	**Test Condition**	**Min.**	**Typ.**	**Max.**	**Unit**
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250μA	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-16V, V_{GS}=0V			-1	μA
		T_J=85°C			-30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250μA	-0.5	-0.6	-1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12V, V_{DS}=0V			±100	nA
$R_{DS(ON)}$ a	Drain-Source On-state Resistance	V_{GS}=-4.5V, I_{DS}=-1.5A		130	170	mΩ
		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	nC
Q_{gs}	Gate-Source Charge			1.3		
Q_{gd}	Gate-Drain Charge			1.3		

Electrical Characteristics (Cont.)(T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	TDM3415S			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics[b]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz		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=10Ω, I_{DS}=-1A, V_{GEN}=-4.5V, R_G=6Ω		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	

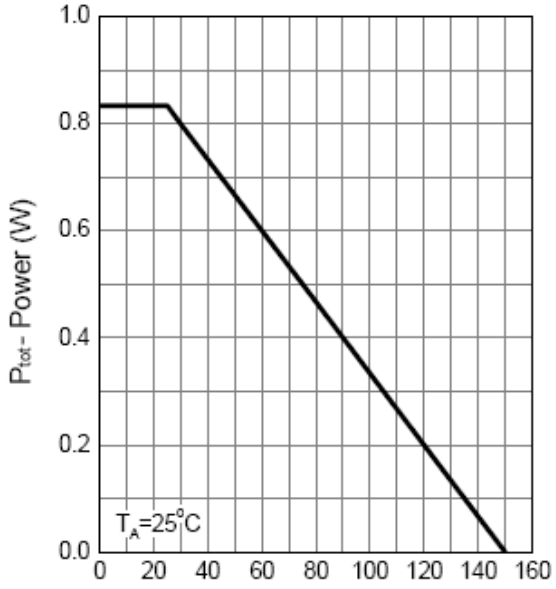
Notes:

a : Pulse test ; pulse width≤ 300μs, duty cycle≤ 2%.

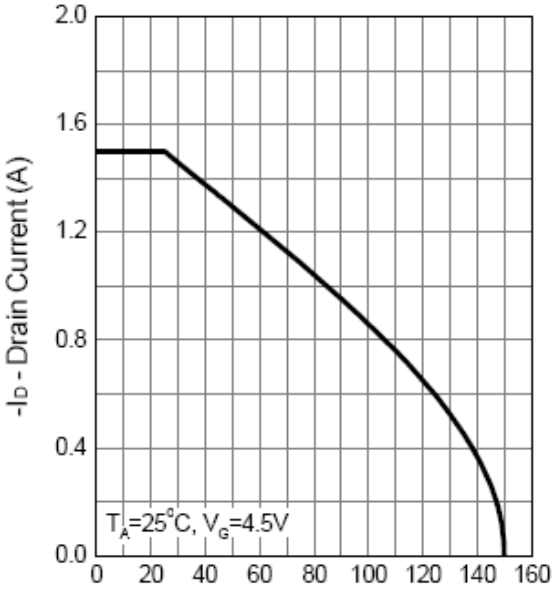
b : Guaranteed by design, not subject to production testing.

Typical Characteristics

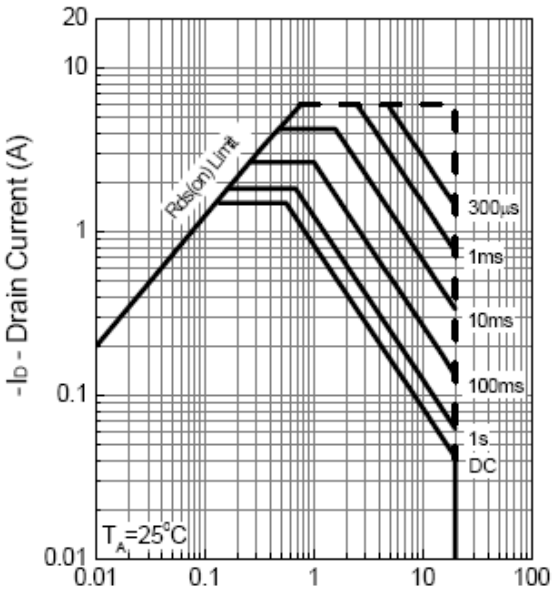
Power Dissipation



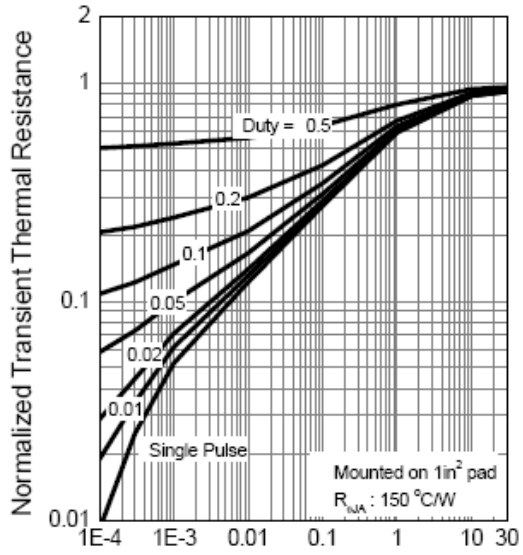
Drain Current



Safe Operation Area

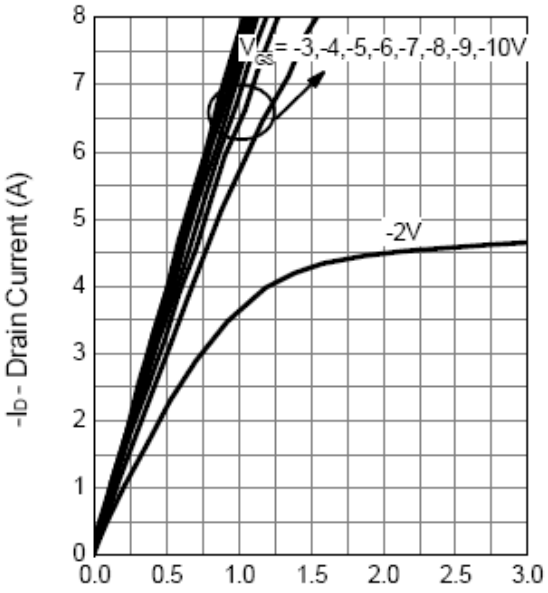


Thermal Transient Impedance



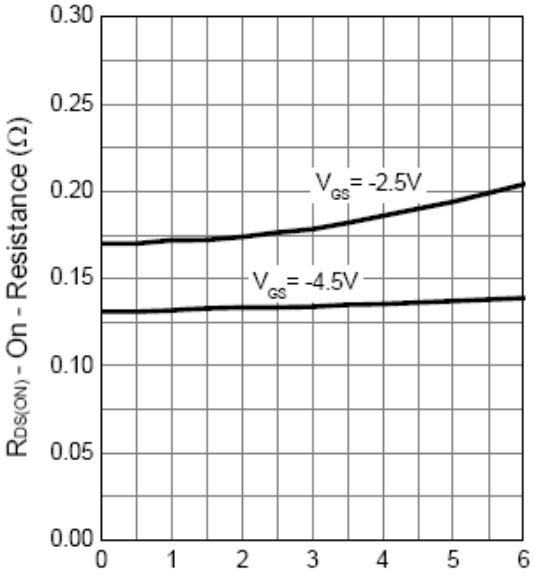
Typical Characteristics (Cont.)

Output Characteristics



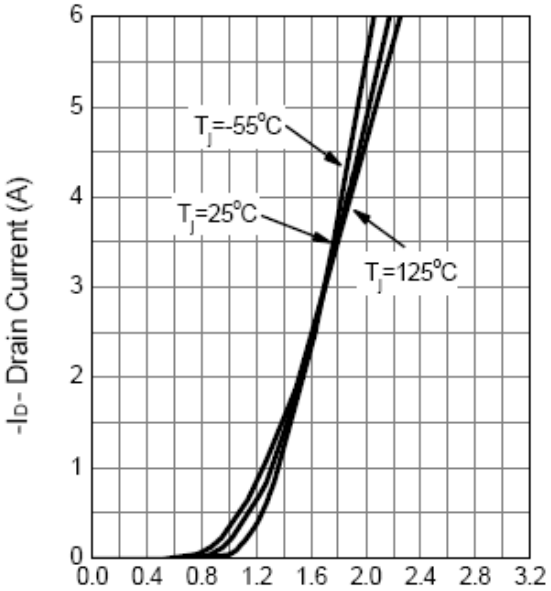
$-V_{DS}$ - Drain - Source Voltage (V)

Drain-Source On Resistance



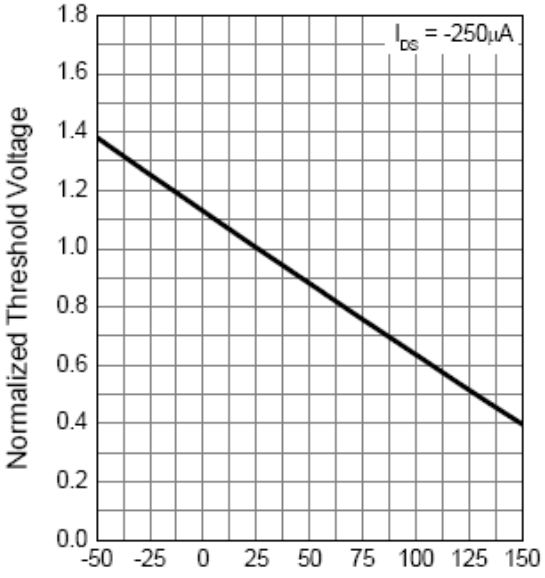
$-I_D$ - Drain Current (A)

Transfer Characteristics



$-V_{GS}$ - Gate - Source Voltage (V)

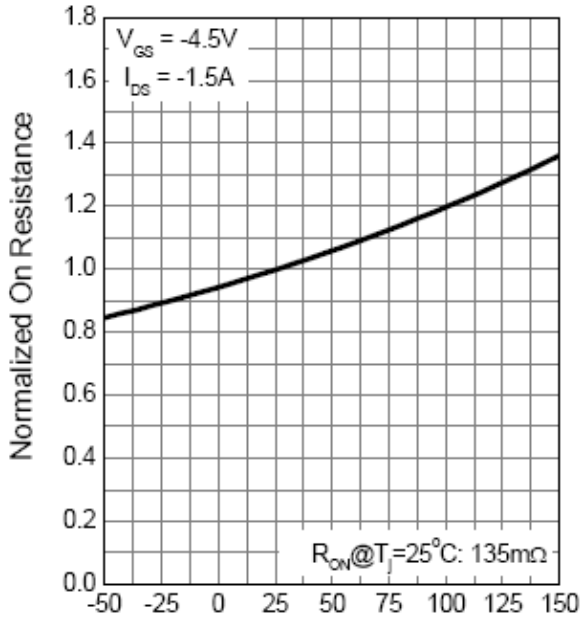
Gate Threshold Voltage



T_j - Junction Temperature (°C)

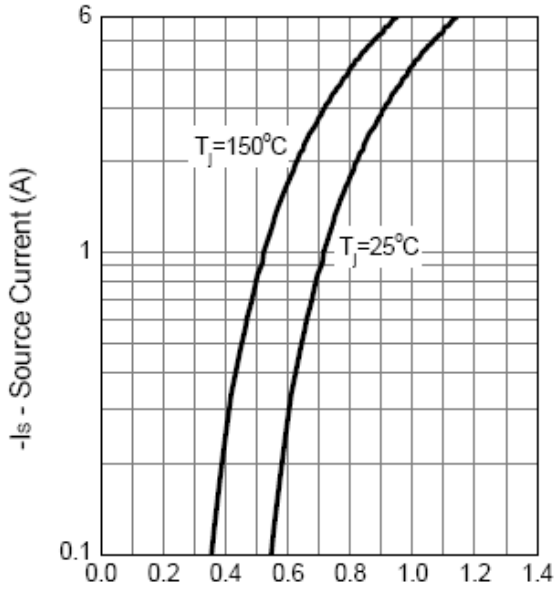
Typical Characteristics (Cont.)

Drain-Source On Resistance



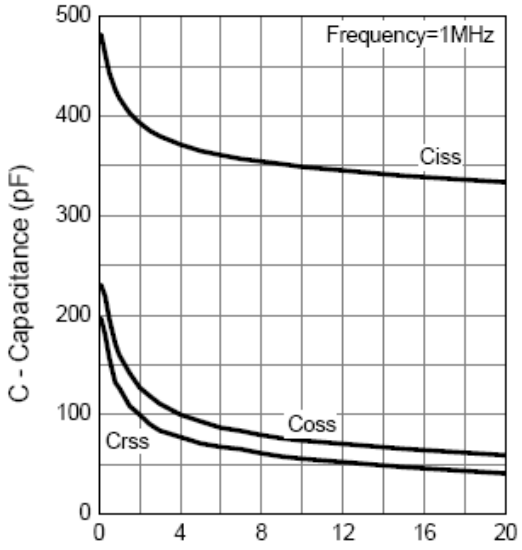
Tj - Junction Temperature (°C)

Source-Drain Diode Forward



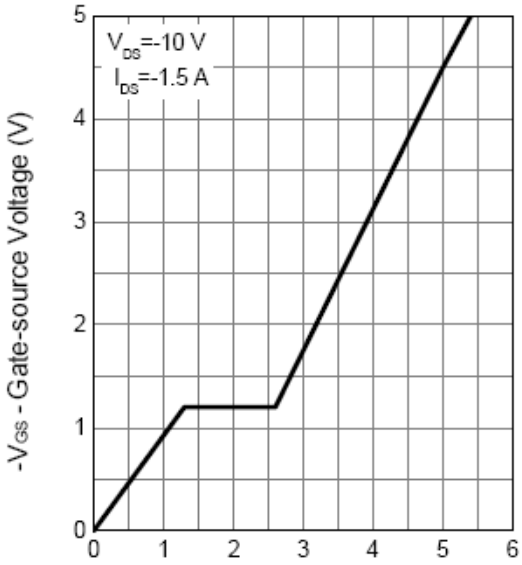
$-V_{SD}$ - Source - Drain Voltage(V)

Capacitance



$-V_{DS}$ - Drain - Source Voltage (V)

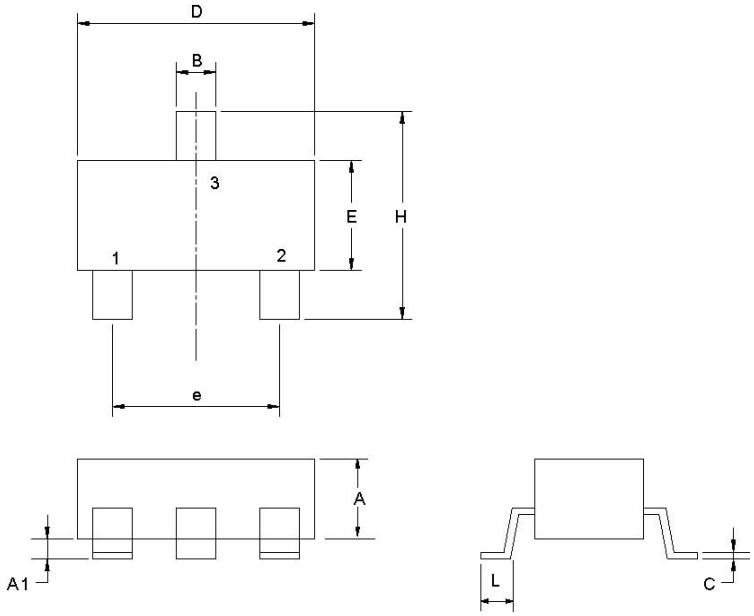
Gate Charge



Q_G - Gate Charge (nC)

Packaging Information

SOT23-3L

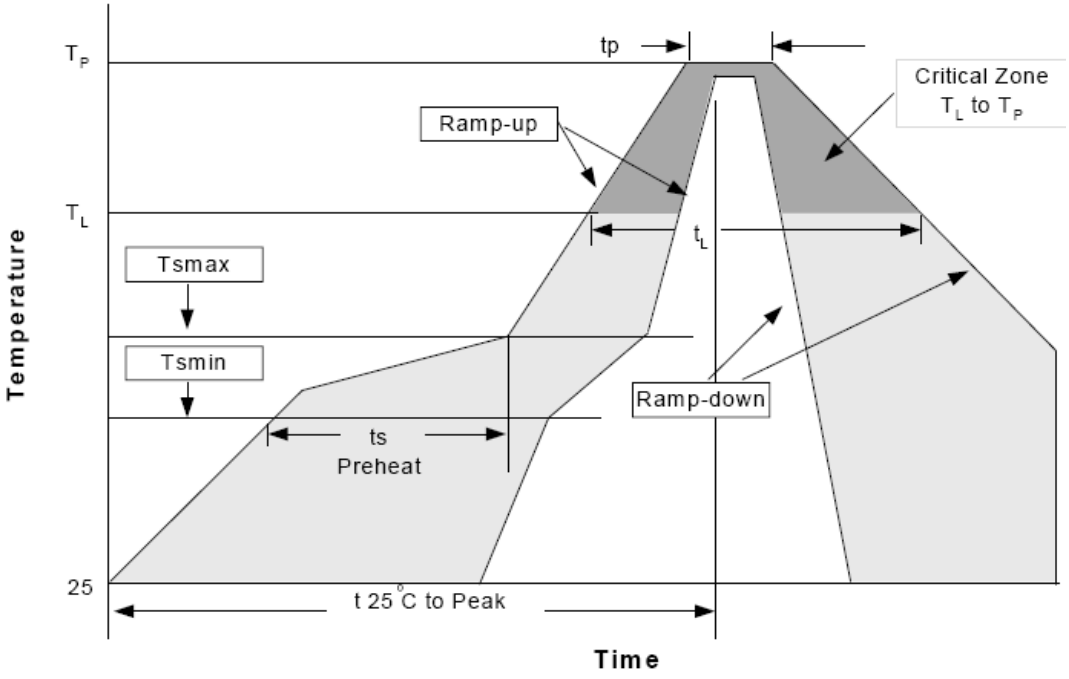


Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
B	0.35	0.51	0.014	0.020
C	0.10	0.25	0.004	0.010
D	2.70	3.10	0.106	0.122
E	1.40	1.80	0.055	0.071
e	1.90/2.1 BSC.		0.075/0.083 BSC.	
H	2.40	3.00	0.094	0.118
L	0.37		0.015	

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

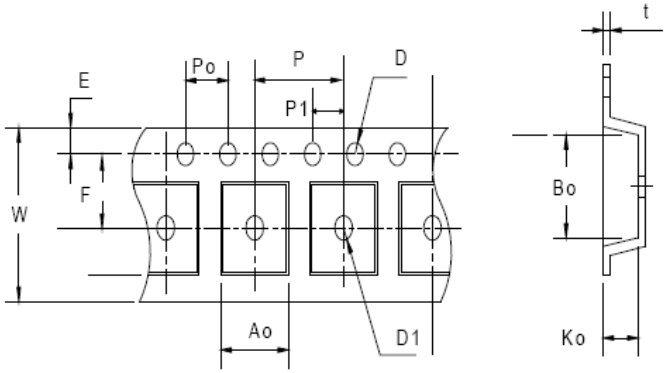
Profile Feature	**Sn-Pb Eutectic Assembly**		**Pb-Free Assembly**	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (TL to TP)	3°C/second max.		3°C/second max.	
Preheat Temperature Min (Tsmin) Temperature Max (Tsmax) Time (min to max) (ts)	100°C 150°C 60-120 seconds		150°C 200°C 60-180 seconds	
Time maintained above: Temperature (TL) Time (tL)	183°C 60-150 seconds		217°C 60-150 seconds	
Peak/Classificatioon Temperature (Tp)	225+0/-5°C	240+0/-5°C	245+0/-5°C	250+0/-5°C
Time within 5°C of actual Peak Temperature (tp)	10-30 seconds		20-40 seconds	
Ramp-down Rate	6°C/second max		6°C/second max	
Time 25°C to Peak Temperature	6 minutes max		8minutes max	

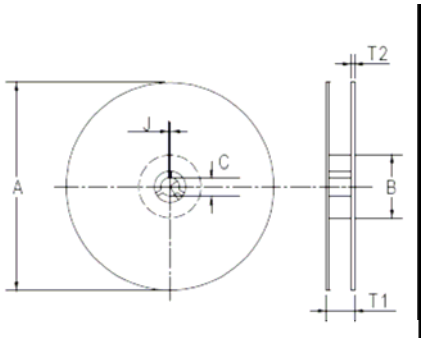
Notes: All temperatures refer to topside of the package .Measured on the body surface.

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