Features

- 20V/3A ,

  $R_{DS(ON)}$=50mΩ(typ.) @ V_{GS}=4.5V

  $R_{DS(ON)}$=90mΩ(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

D

G

S

N-Channel MOSFET

Ordering and Marking Information

TDM2302S□ □ -□ □ □ 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
TDM2302S M24 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.

TECHCODE reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
VDSS	Drain-Source Voltage		20	V
VGSS	Gate-Source Voltage		±10	
ID*	Continuous Drain Current		3	A
IDM*	300μs Pulsed Drain Current	VGS=4.5V	10	
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)

Symbol	Parameter	Test Condition	TDM2302S			Unit
			Min.	Typ.	Max.	
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
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	0.5	0.7	1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±10V, V_{DS}=0V			±100	nA
$R_{DS(ON)}$ a	Drain-Source On-state Resistance	V_{GS}=4.5V, I_{DS}=3A		50	70	mΩ
		V_{GS}=2.5V, I_{DS}=2A		90	110	
V_{SD} a	Diode Forward Voltage	I_{SD}=0.55A, V_{GS}=0V		-0.5	-1.3	V
Gate Charge Characteristics b						
Q_g	Total Gate Charge	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=3A		5	6.5	nC
Q_{gs}	Gate-Source Charge			0.7		
Q_{gd}	Gate-Drain Charge			0.7		

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

Symbol	Parameter	Test Condition	TDM2302S			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics[b]						
R_G	Gate Resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz		5		Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz		255		PF
C_{oss}	Output Capacitance			70		
C_{rss}	Reverse Transfer Capacitance			50		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-10V, R_L=10Ω, I_{DS}=1A, V_{GEN}=4.5V, R_G=6Ω		6	15	ns
T_r	Turn-on Rise Time			5	11	
$t_{d(OFF)}$	Turn-off Delay Time			12	24	
T_f	Turn-off Fall Time			6	15	

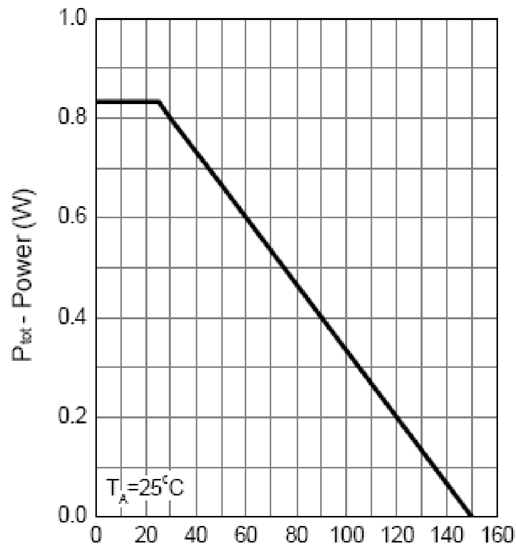
Notes:

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

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

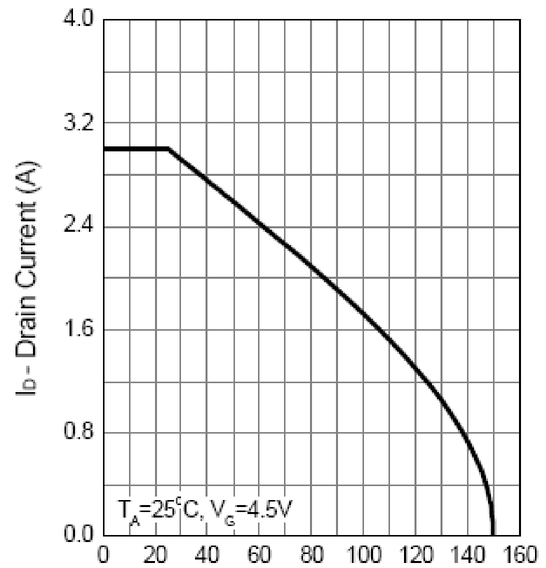
Typical Characteristics

Power Dissipation



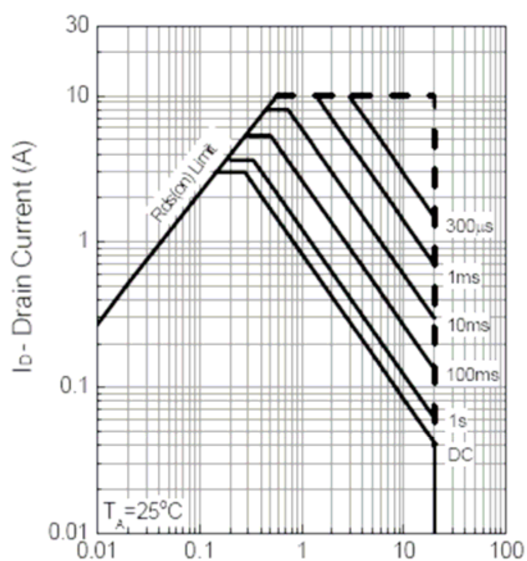
Tj - Junction Temperature (°C)

Drain Current



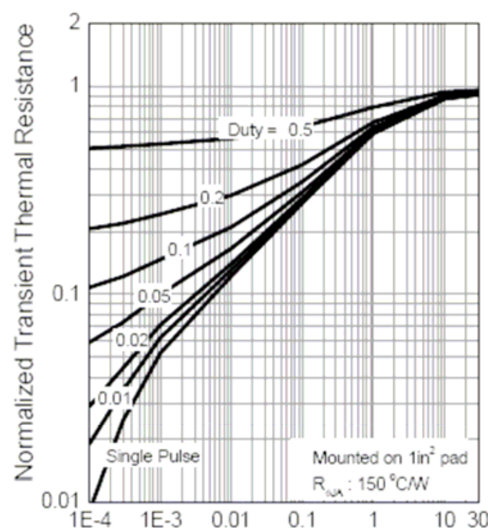
Tj - Junction Temperature (°C)

Safe Operation Area



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

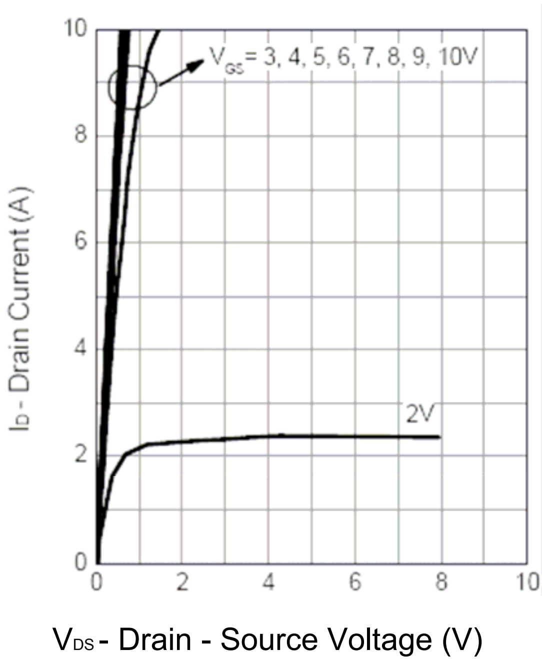
Thermal Transient Impedance



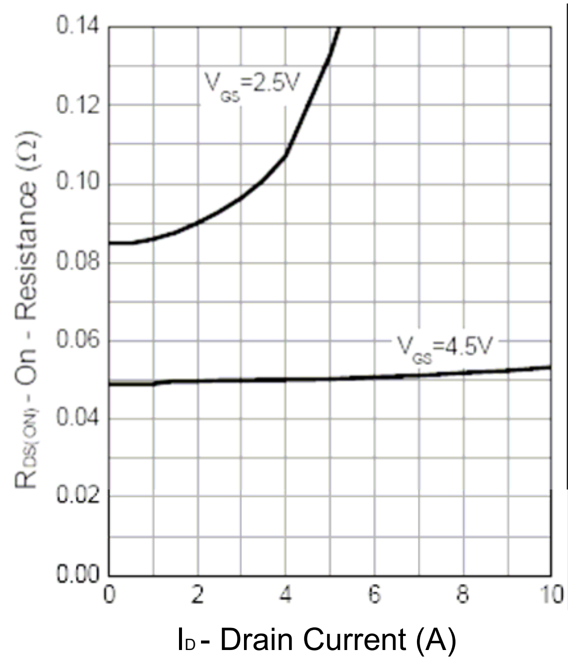
Square Wave Pulse Duration (sec)

Typical Characteristics (Cont.)

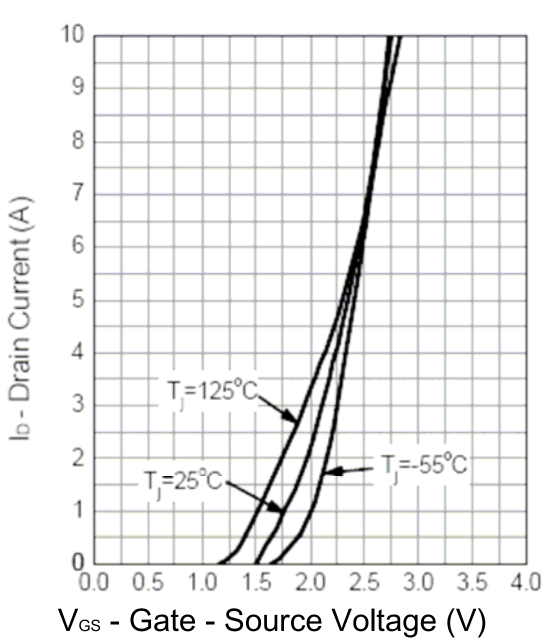
Output Characteristics



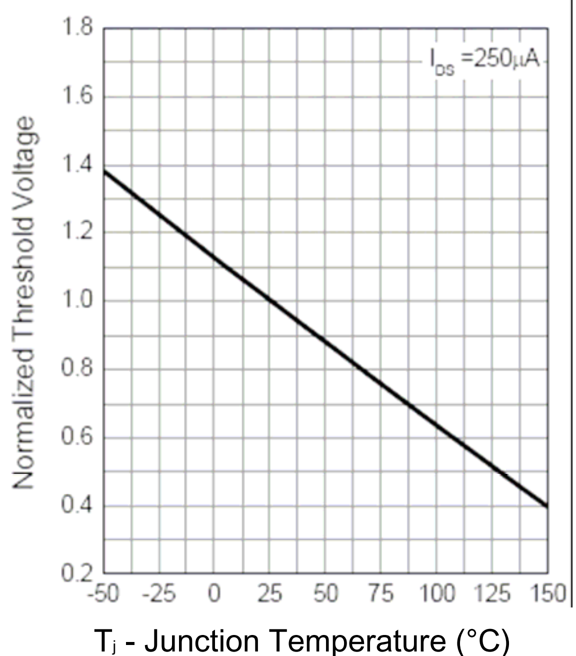
Drain-Source On Resistance



Transfer Characteristics

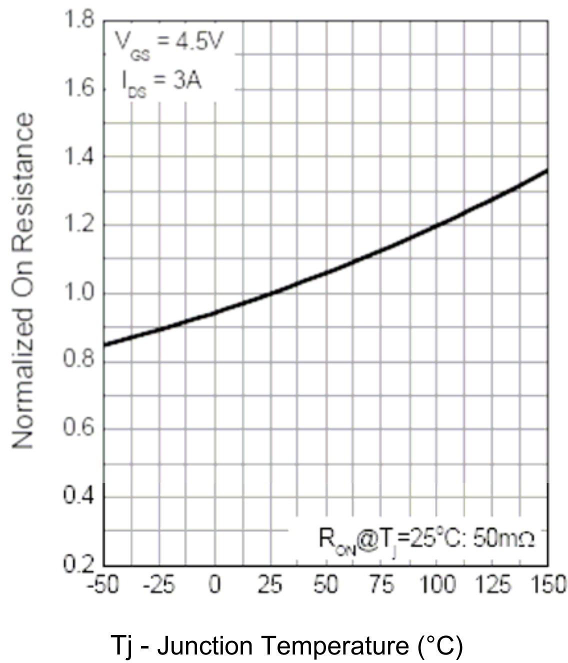


Gate Threshold Voltage



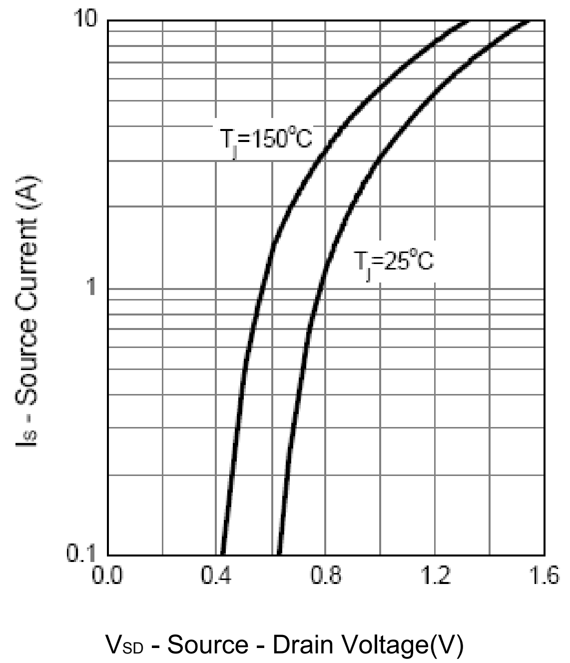
Typical Characteristics (Cont.)

Drain-Source On Resistance



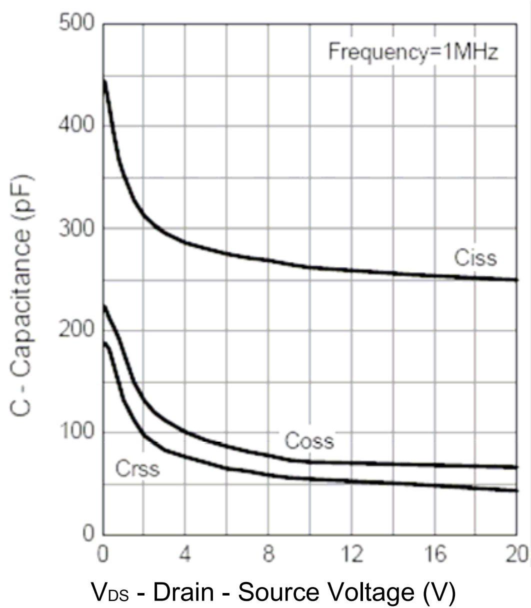
Tj - Junction Temperature (°C)

Source-Drain Diode Forward



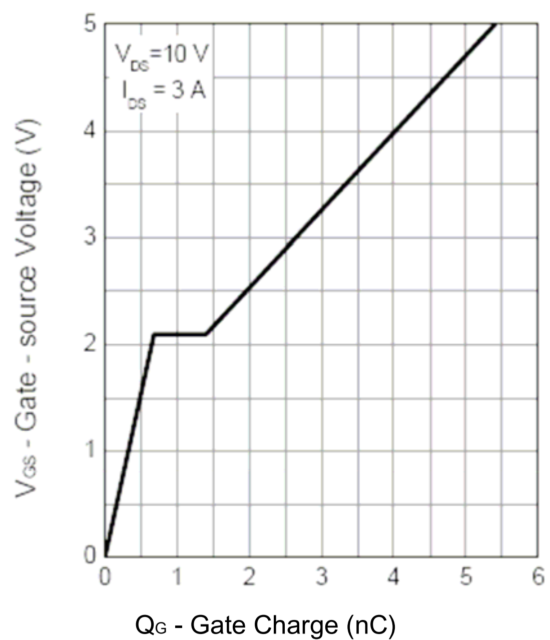
V_{SD} - Source - Drain Voltage(V)

Capacitance



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

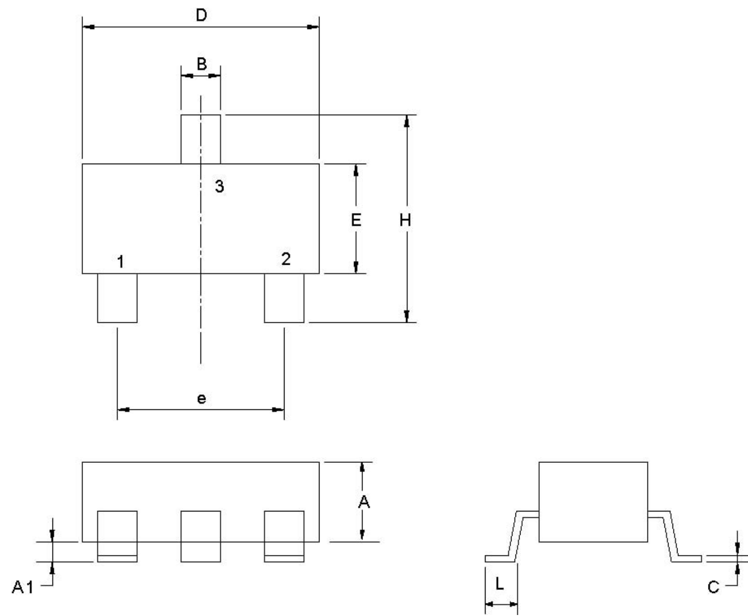
Gate Charge



Q_G - Gate Charge (nC)

Packaging Information

SOT23-3L

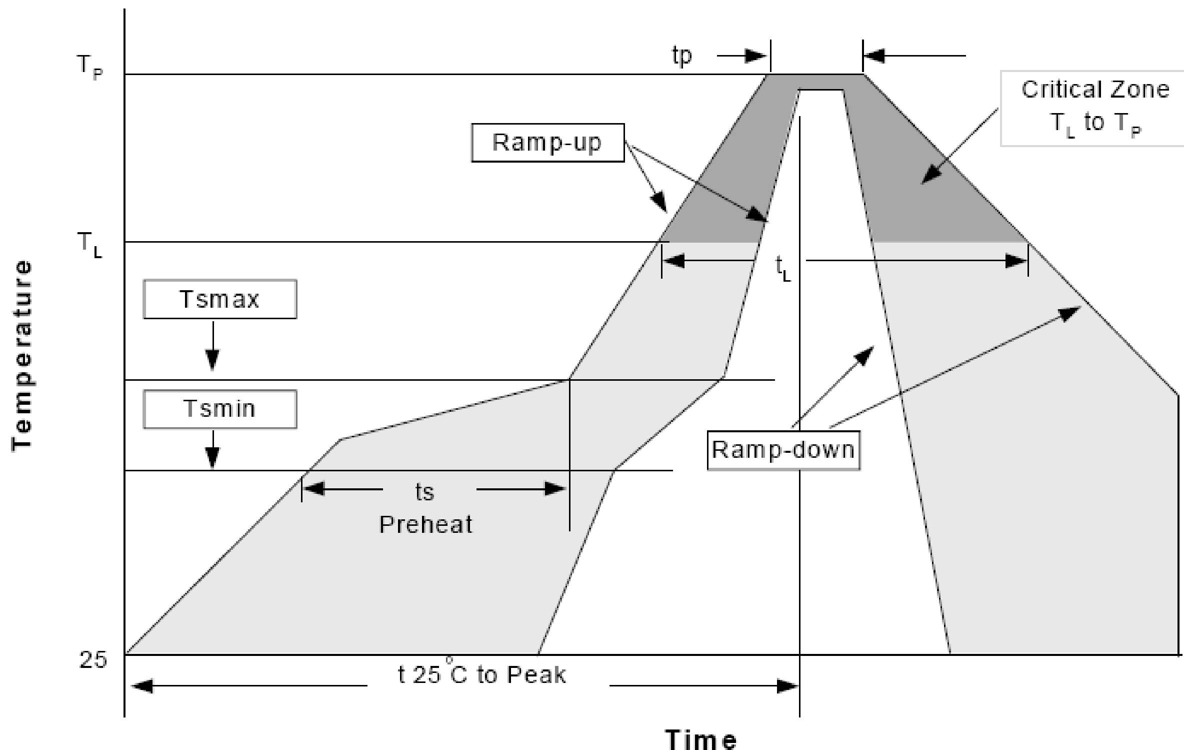


Dim	Millimeters		Inches	
	Min.	**Max.**	**Min.**	**Max.**
A	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
B	0.35	0.51	0.014	0.020
C	0.10	0.25	0.004	0.010
D	2.70	3.10	0.106	0.122
E	1.40	1.80	0.055	0.071
e	1.90/2.1 BSC.		0.075/0.083 BSC.	
H	2.40	3.00	0.094	0.118
L	0.37		0.015	

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
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)	See table 1	See table 2
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.

Classification Reflow Profiles(Cont.)

Table 1. SnPb Entectic Process – Package Peak Reflow Temperatures

Package Thickness	Volume mm3 <350	Volume mm3 ≥350
<2.5 mm	240 +0/-5°C	225 +0/-5°C
≥ 2.5 mm	225 +0/-5°C	225 +0/-5°C

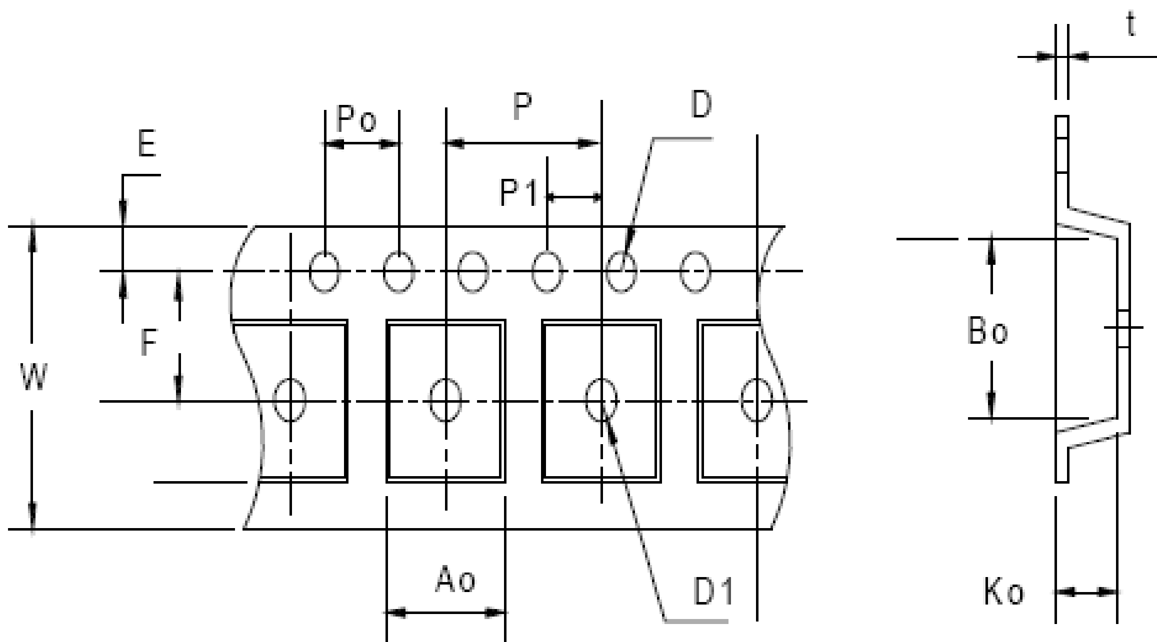
Table 2. Pb-free Process – Package Classification Reflow Temperatures

Package Thickness	Volume mm3 <350	Volume mm3 350-2000	Volume mm3 >2000
<1.6 mm	260 +0°C*	260 +0°C*	260 +0°C*
1.6 mm – 2.5 mm	260 +0°C*	250 +0°C*	245 +0°C*
≥ 2.5 mm	250 +0°C*	245 +0°C*	245 +0°C*
*Tolerance: The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0°C. For example 260°C+0°C) at the rated MSL level.			

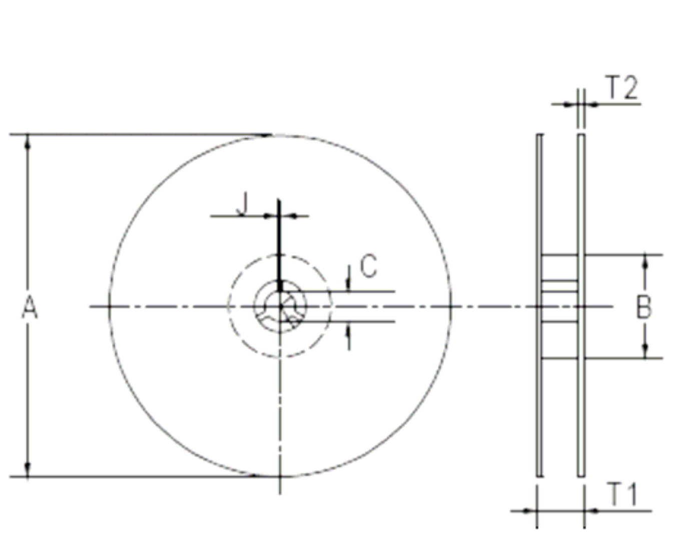
Reliability Test Program

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



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