

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

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	± 12	
I_D	Continuous Drain Current	$T_A = 25^\circ\text{C}$	A
		$T_A = 70^\circ\text{C}$	
I_{DM}	Pulsed Drain Current	$T_A = 25^\circ\text{C}$	
I_S	Diode Continuous Forward Current	1	A
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	W
		$T_A = 70^\circ\text{C}$	
$R_{\theta JA}^*$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{sec}$	$^\circ\text{C/W}$
		Steady state	

Note: *Surface Mounted on 1in^2 pad area, $t \leq 10\text{sec}$.

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, 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	1	1.5	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} =10V, I _{DS} =4.8A	-	33	40	mΩ
		V _{GS} =4.5V, I _{DS} =4.4A	-	38	48	
		V _{GS} =2.5V, I _{DS} =3.3A	-	60	85	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =4A, dI _{SD} /dt=100A/μs	-	9	-	ns
Q _{rr}	Reverse Recovery Charge		-	4.7	-	nC

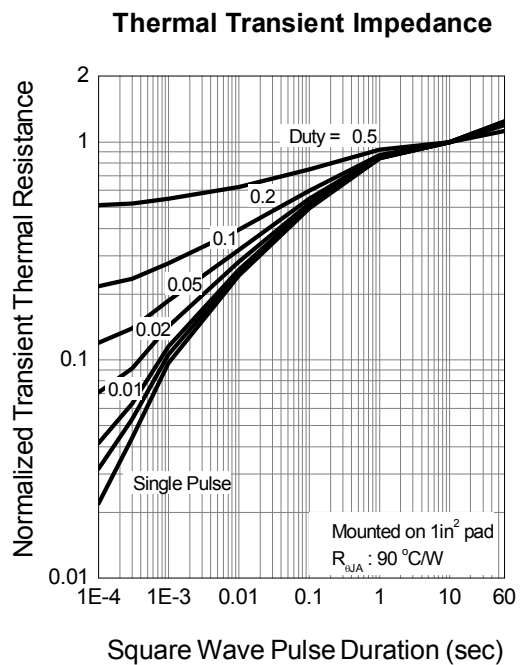
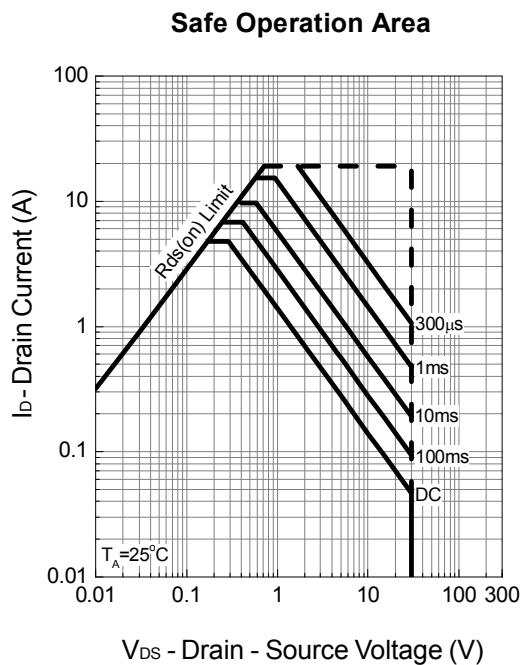
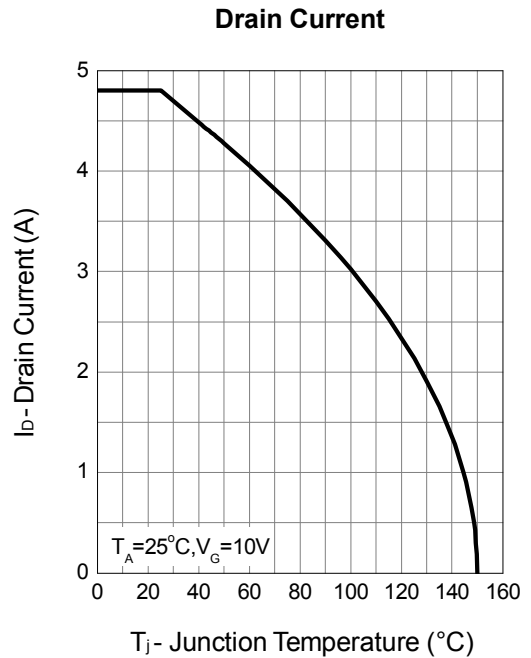
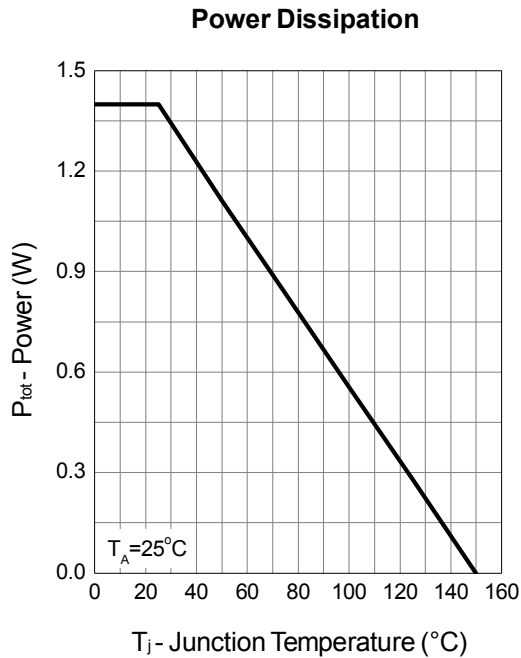
Electrical Characteristics (Cont.) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
Dynamic Characteristics ^b							
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	1.5	-	Ω	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	-	320	-	pF	
C _{oss}	Output Capacitance		-	37	-		
C _{rss}	Reverse Transfer Capacitance		-	30	-		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	3	5.5	ns	
T _r	Turn-on Rise Time		-	11	20		
t _{d(OFF)}	Turn-off Delay Time		-	15	27		
T _f	Turn-off Fall Time		-	2.5	4.5		
Gate Charge Characteristics ^b							
Q _g	Total Gate Charge	V _{DS} =15V, I _{DS} =4A	V _{GS} =4.5V,	-	4	-	nC
			V _{GS} =10V	-	8.8	-	
Q _{gs}	Gate-Source Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =4A	-	0.9	-		
Q _{gd}	Gate-Drain Charge		-	1.4	-		

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

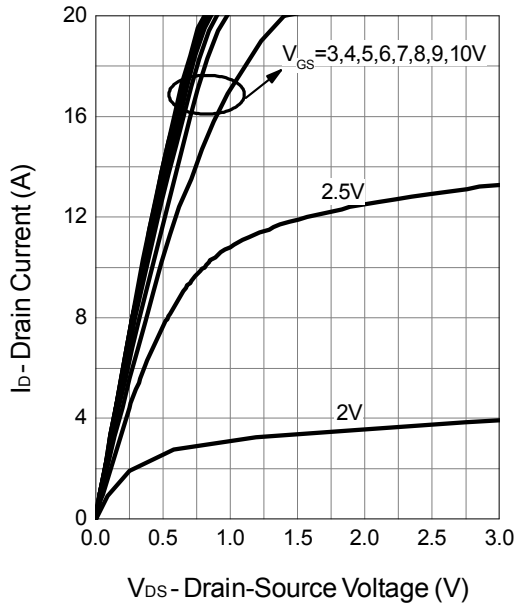
Note b: Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

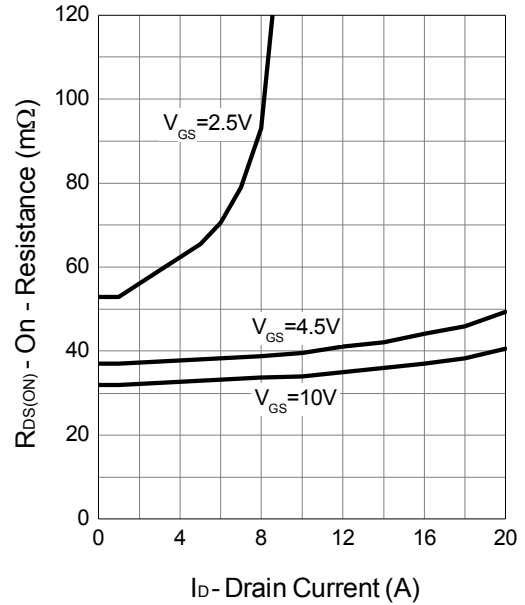


Typical Operating Characteristics (Cont.)

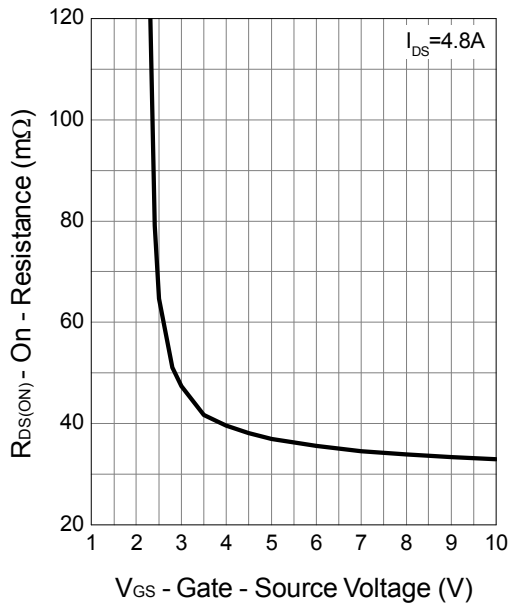
Output Characteristics



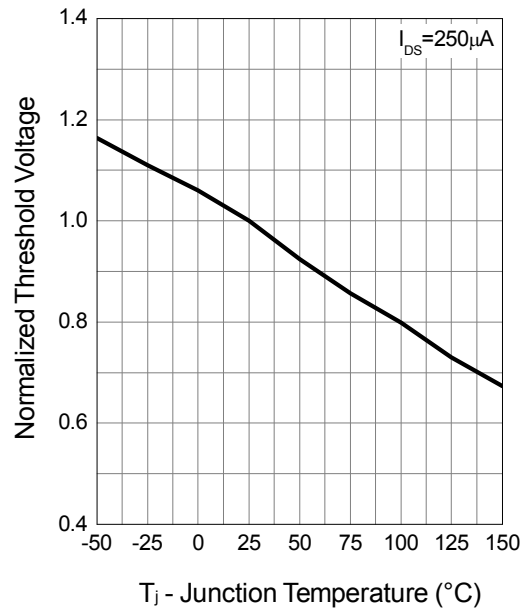
Drain-Source On Resistance



Gate-Source On Resistance

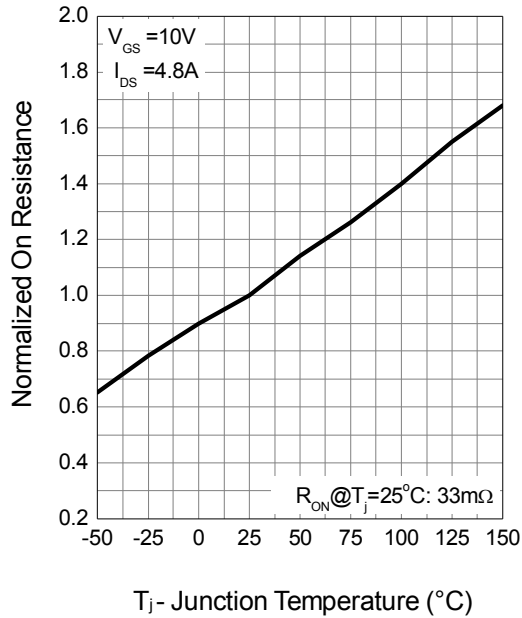


Gate Threshold Voltage

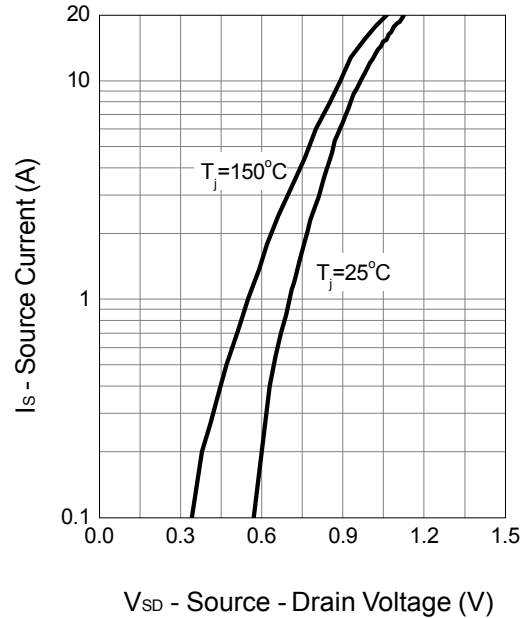


Typical Operating Characteristics (Cont.)

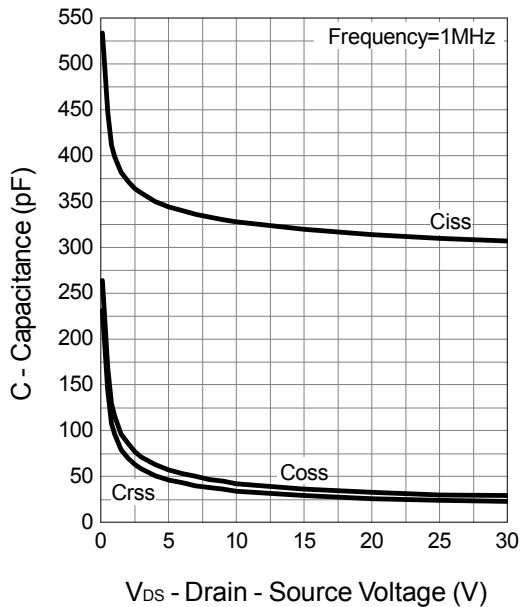
Drain-Source On Resistance



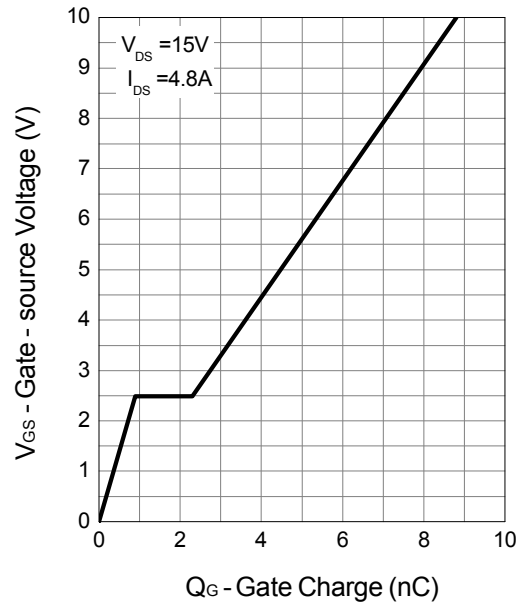
Source-Drain Diode Forward



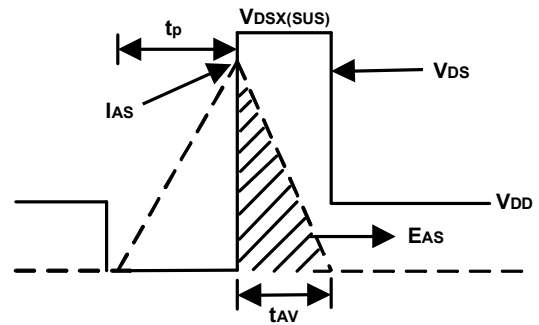
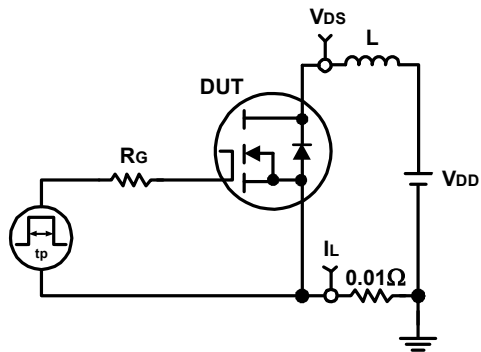
Capacitance



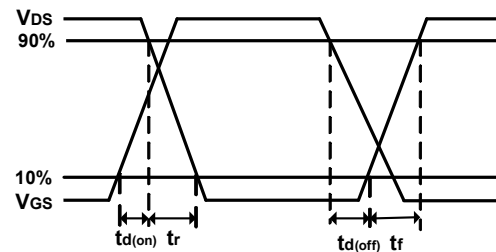
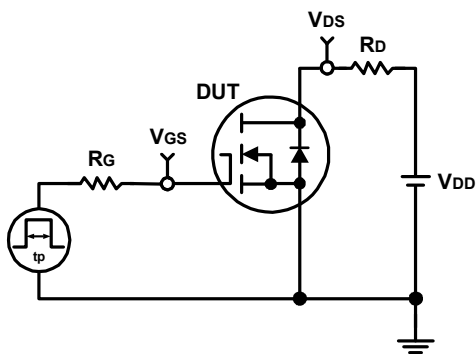
Gate Charge



Avalanche Test Circuit and Waveforms

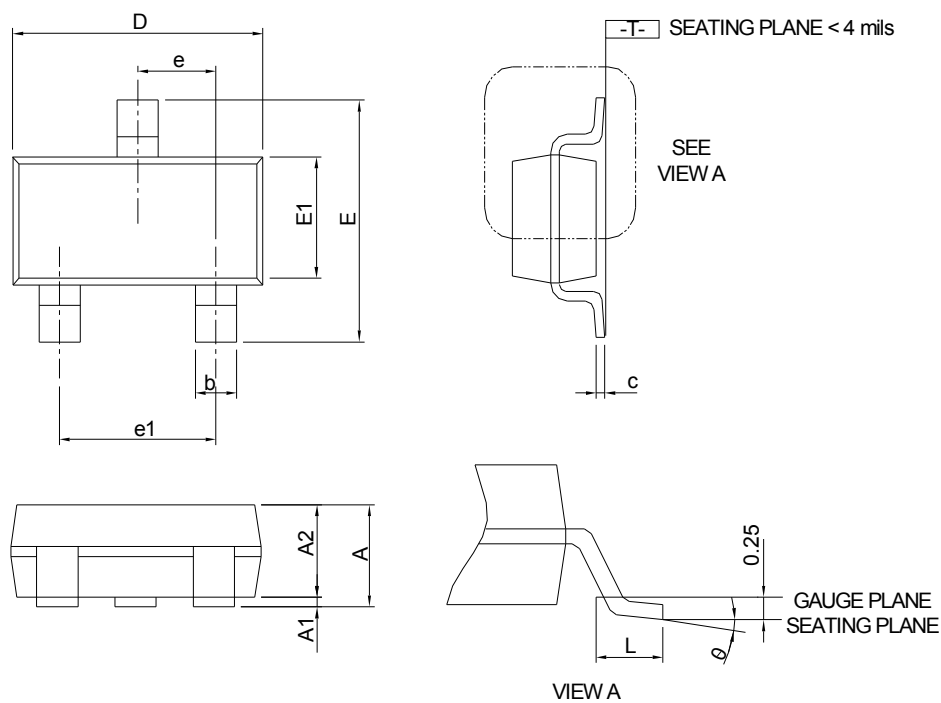


Switching Time Test Circuit and Waveforms



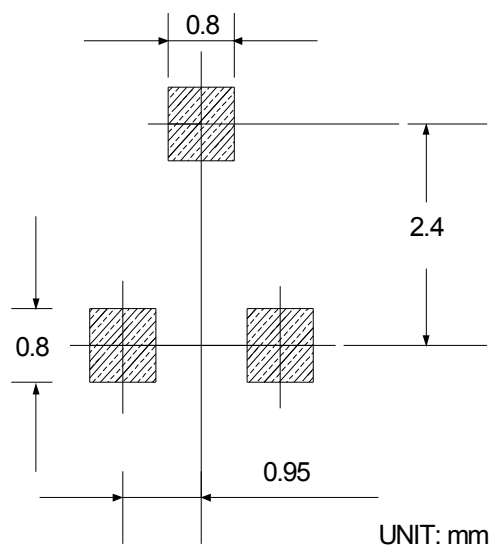
Package Information

SOT-23-3



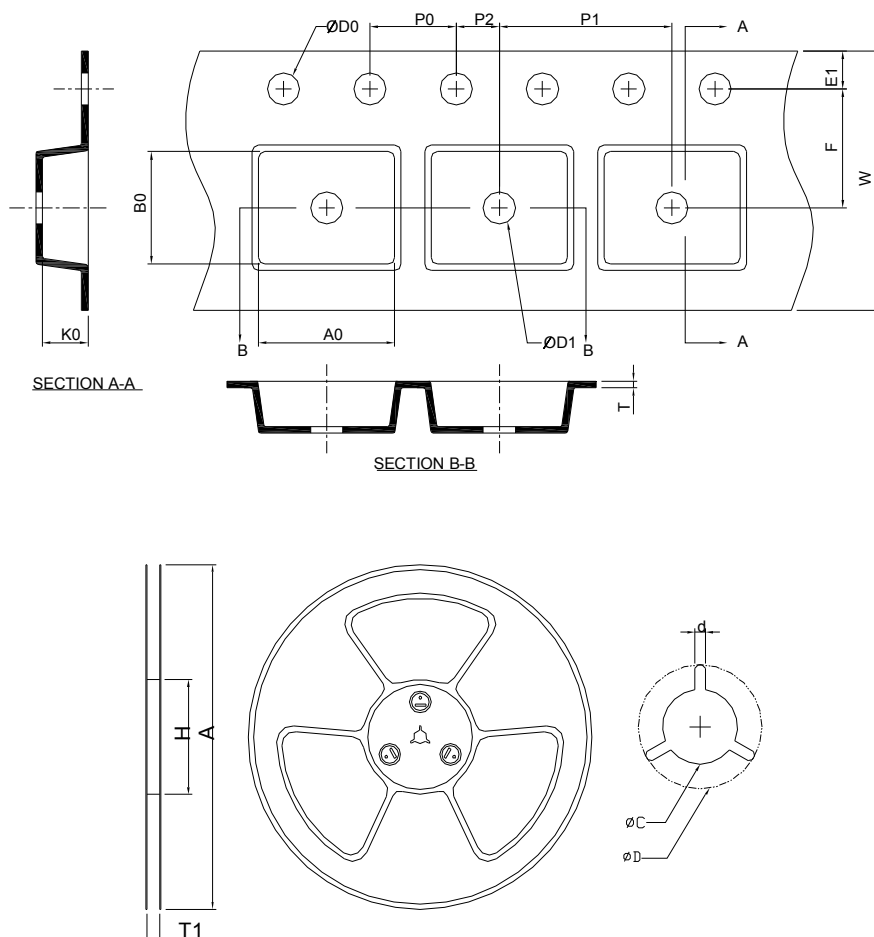
SYMBOL	SOT-23-3			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.20	-	0.047
A1	0.00	0.08	0.000	0.003
A2	0.90	1.12	0.035	0.044
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.70	3.10	0.106	0.122
E	2.60	3.00	0.102	0.118
E1	1.40	1.80	0.055	0.071
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

RECOMMENDED LAND PATTERN



Note : Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.

Carrier Tape & Reel Dimensions

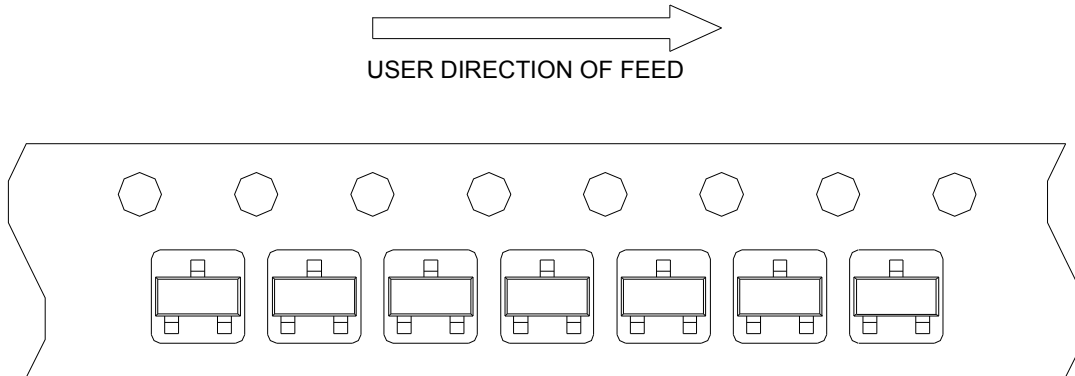


Application	A	H	T1	C	d	D	W	E1	F
SOT-23-3	178.0±2.00	50 MIN.	8.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	8.0±0.30	1.75±0.10	3.5±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.10	4.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.0 MIN.	0.6+0.00 -0.40	3.20±0.20	3.10±0.20	1.50±0.20

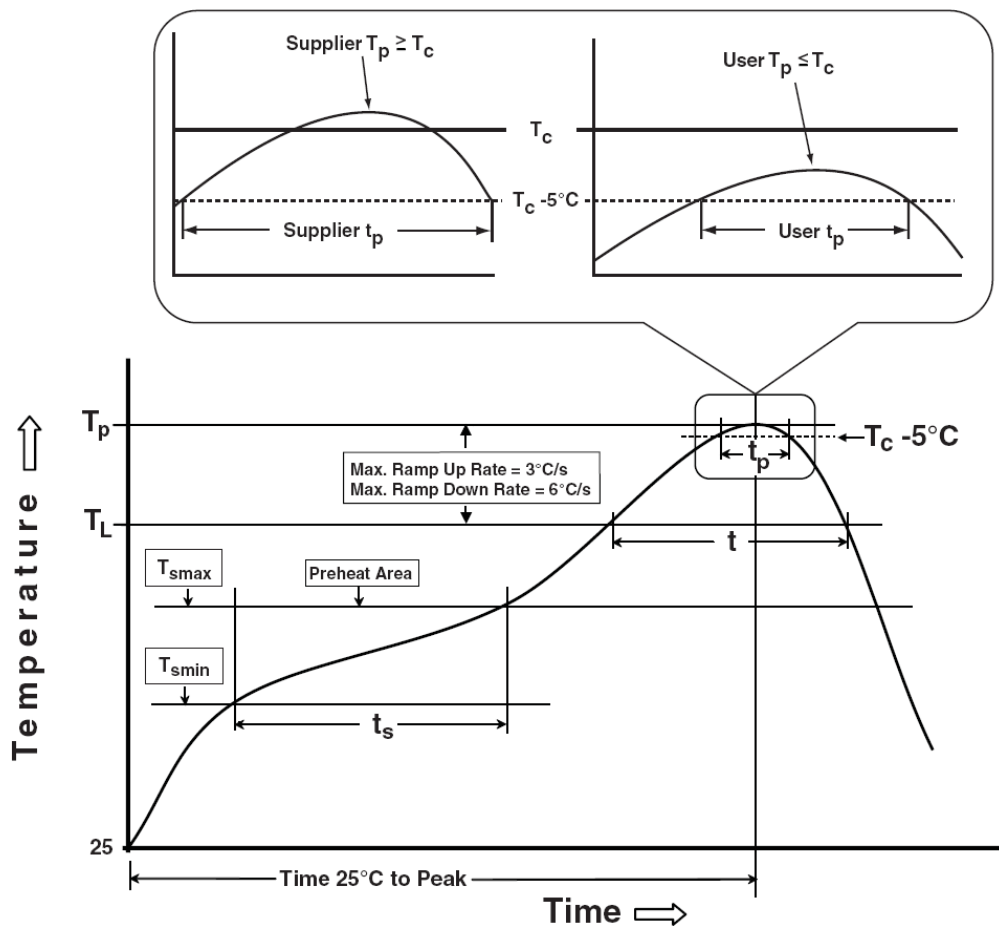
(mm)

Taping Direction Information

SOT-23-3



Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} to T_{smax}) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (t_p)** within 5°C of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate (T_p to T_{smax})	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature (T_p) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.		

Table 1. SnPb Eutectic Process – Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2. Pb-free Process – Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	1000 Hrs, 80% of VDS max @ T_{jmax}
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ T_{jmax}
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -65°C~150°C

Customer Service

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