

Absolute Maximum Ratings ($T_A = 25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V _{DSS}	Drain-Source Voltage		40	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	
I _S	Diode Continuous Forward Current	T _A =25°C	2	A
I _D	Continuous Drain Current	T _A =25°C	10.5	A
		T _A =70°C	8.4	
I _{DM} ^a	Pulsed Drain Current	T _A =25°C	30	
P _D	Maximum Power Dissipation	T _A =25°C	2.08	W
		T _A =70°C	1.3	
R _{θJA}	Thermal Resistance-Junction to Ambient	t ≤ 10s	30	°C/W
		Steady State	60	
R _{θJL}	Thermal Resistance-Junction to Lead	Steady State	20	
I _{AS} ^b	Avalanche Current, Single pulse	L=0.1mH	23	A
E _{AS} ^b	Avalanche Energy, Single pulse	L=0.1mH	26	mJ

Note a : Max. current is limited by bonding wire.

Note b : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_J = 25^{\circ}\text{C}$).

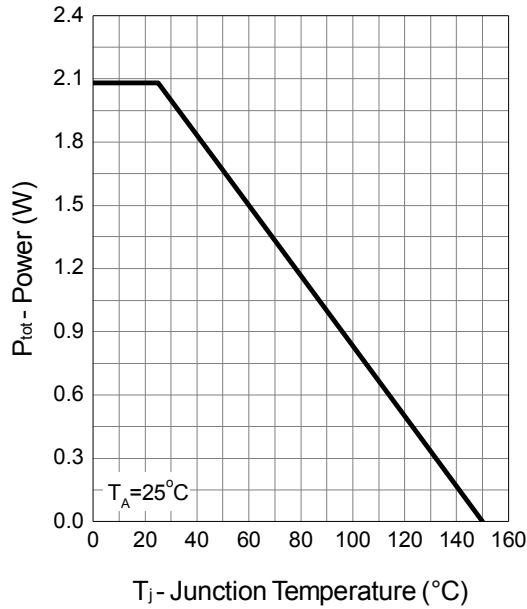
Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1.5	1.8	2.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^c	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =7A	-	10.5	12.5	mΩ
		T _J =125°C	-	15.75	-	
		V _{GS} =4.5V, I _{D5} =5A	-	12	15.5	
Gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =15A	-	31	-	S
Diode Characteristics						
V _{SD} ^c	Diode Forward Voltage	I _{SD} =10A, V _{GS} =0V	-	0.9	1.1	V
t _{rr}	Reverse Recovery Time	V _{DD} =20V, I _{SD} =10A, dl _{SD} /dt=100A/μs	-	15.2	-	ns
t _a	Charge Time		-	9.4	-	
t _b	Discharge Time		-	5.8	-	
Q _{rr}	Reverse Recovery Charge		-	9.5	-	nC
Dynamic Characteristics ^d						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,F=1MHz	0.7	1.1	1.8	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Frequency=1.0MHz	-	1125	-	pF
C _{oss}	Output Capacitance		-	132	-	
C _{rss}	Reverse Transfer Capacitance		-	70	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =20V, R _L =20Ω, I _{DS} =1A, V _{GEN} =10V, R _G =1Ω	-	12.6	-	ns
t _r	Turn-on Rise Time		-	10	-	
t _{d(OFF)}	Turn-off Delay Time		-	23.6	-	
t _f	Turn-off Fall Time		-	6	-	
Gate Charge Characteristics ^d						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =4.5V, I _{DS} =7A	-	9.4	-	nC
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _{DS} =7A	-	20	28	
Q _{gth}	Threshold Gate Charge		-	2	-	
Q _{gs}	Gate-Source Charge		-	3.9	-	
Q _{gd}	Gate-Drain Charge		-	3	-	

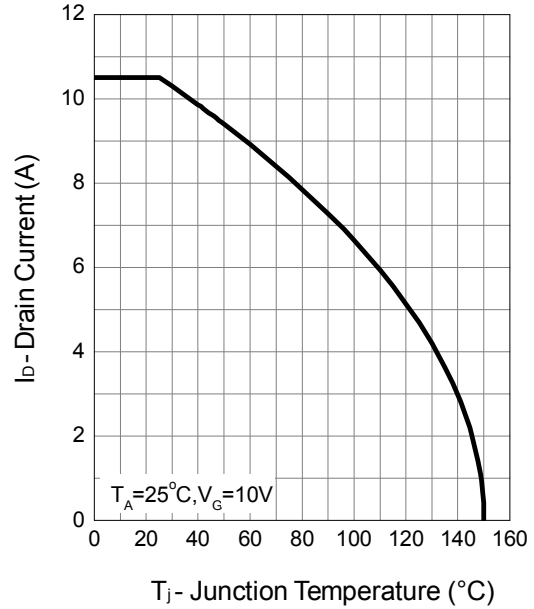
Note c : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Typical Operating Characteristics

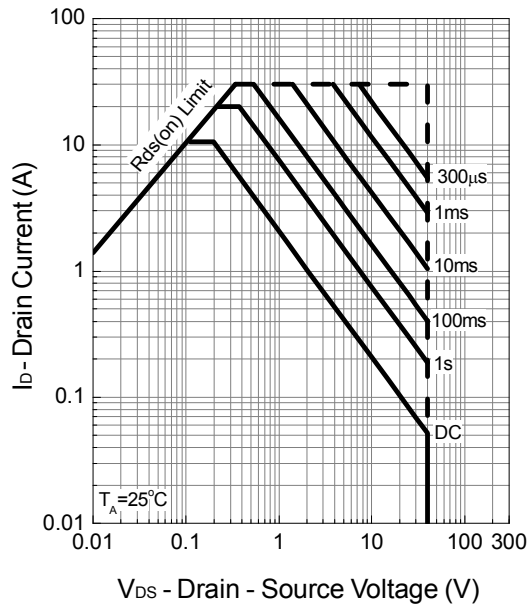
Power Dissipation



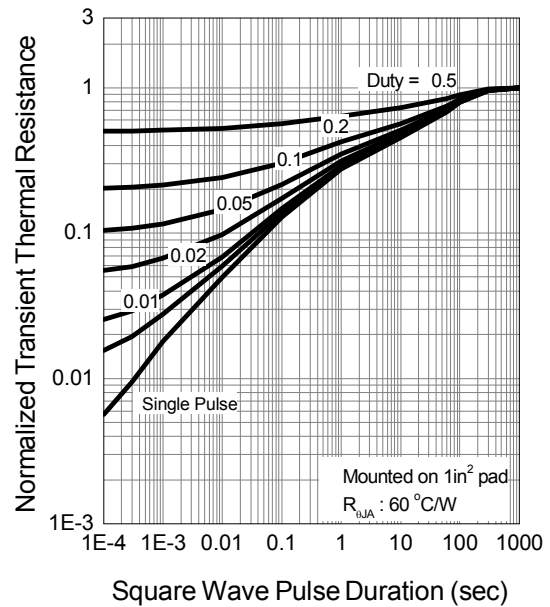
Drain Current



Safe Operation Area

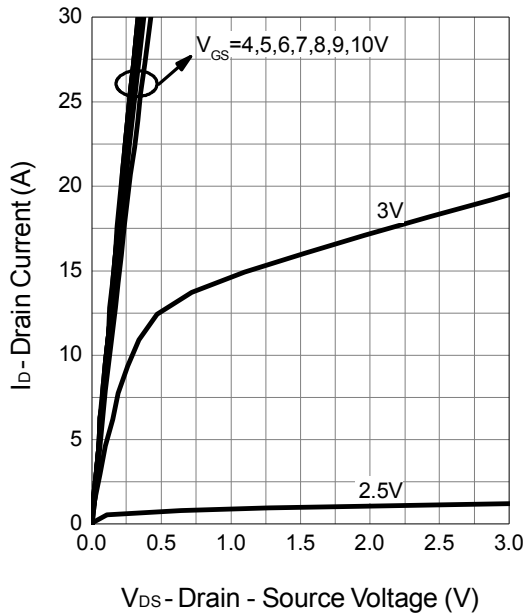


Thermal Transient Impedance

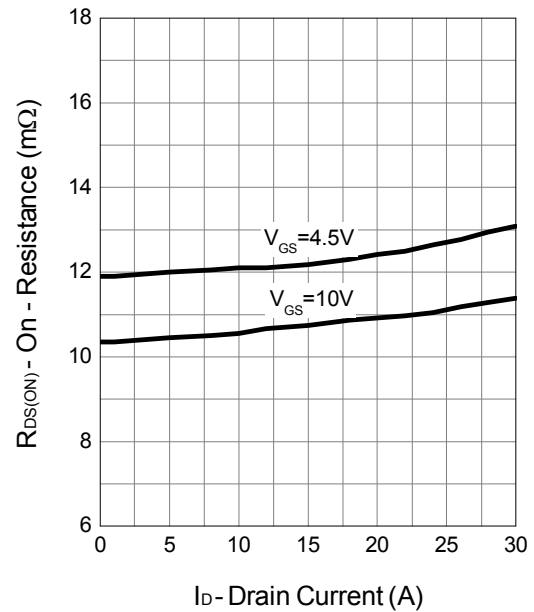


Typical Operating Characteristics (Cont.)

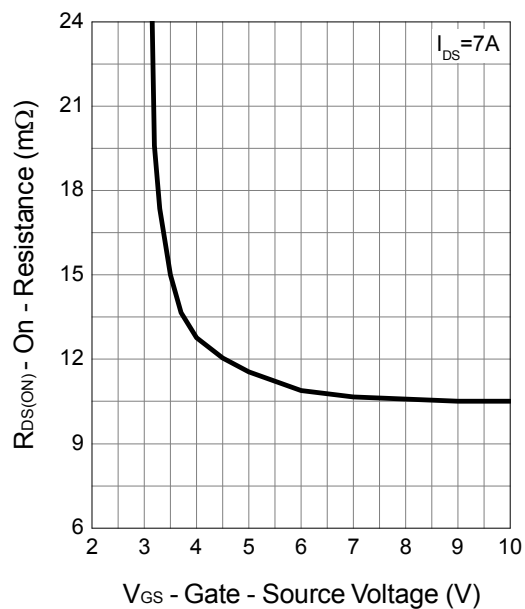
Output Characteristics



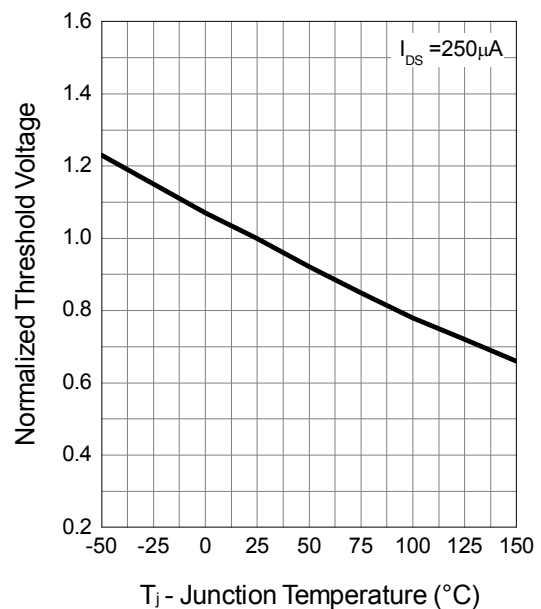
Drain-Source On Resistance



Gate-Source On Resistance

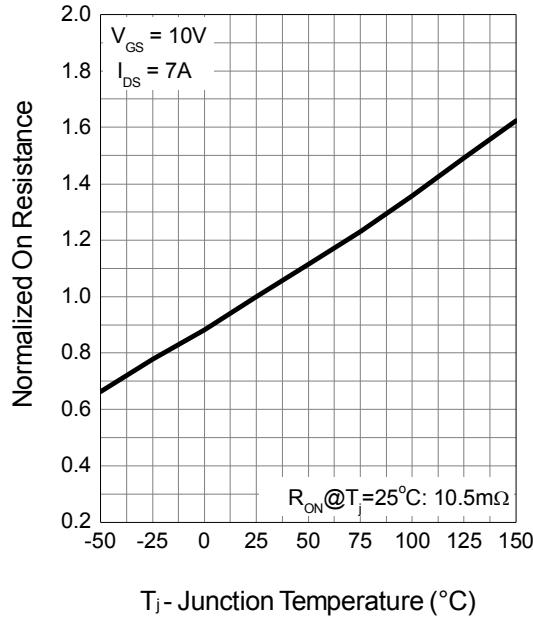


Gate Threshold Voltage

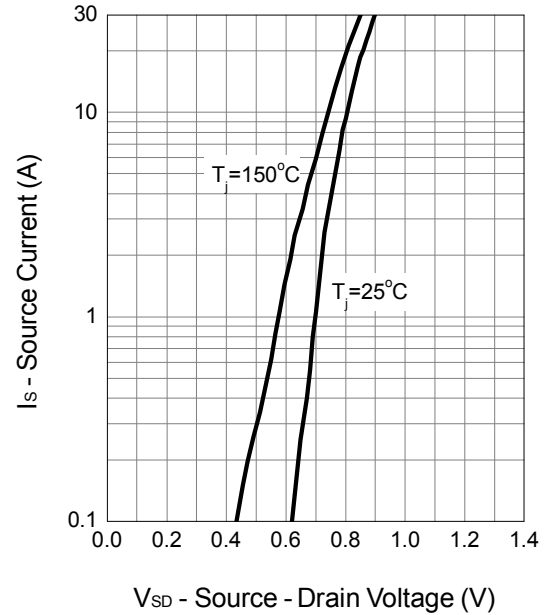


Typical Operating Characteristics (Cont.)

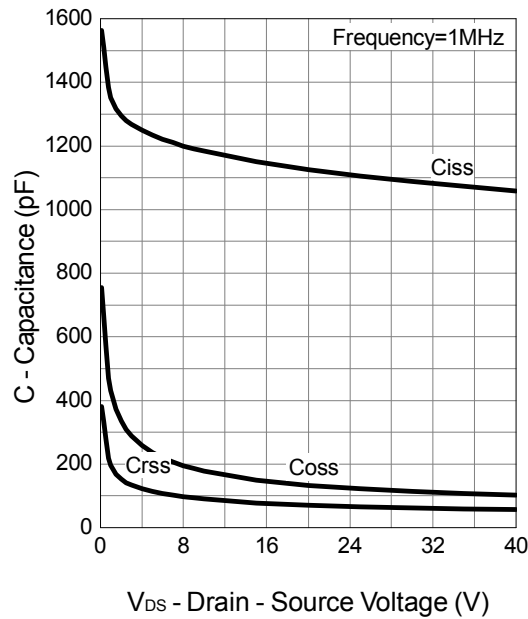
Drain-Source On Resistance



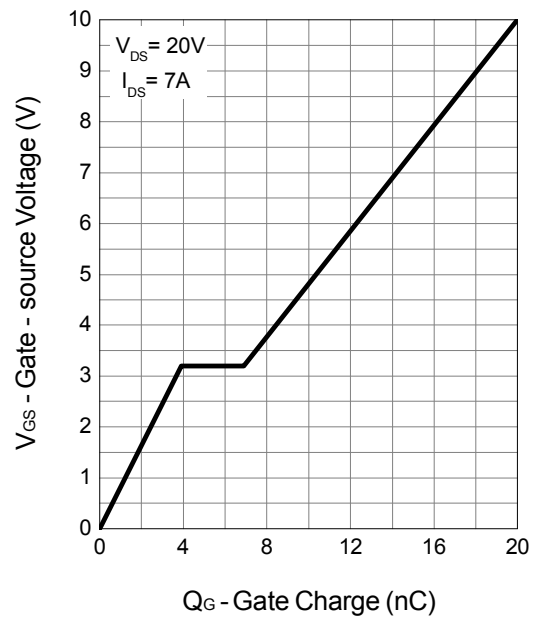
Source-Drain Diode Forward



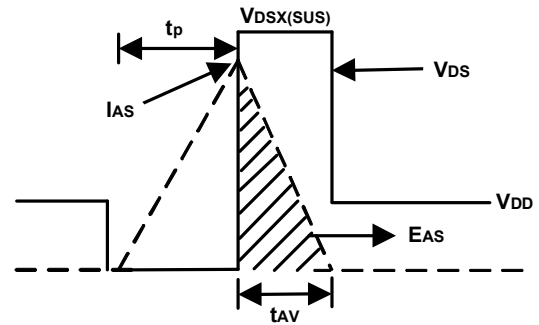
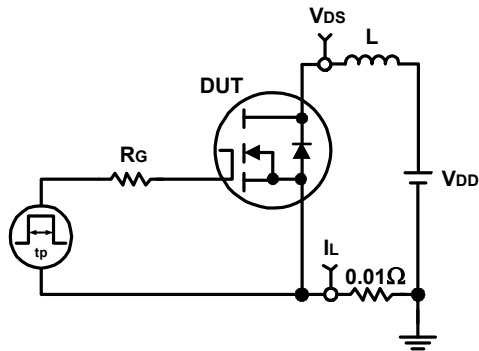
Capacitance



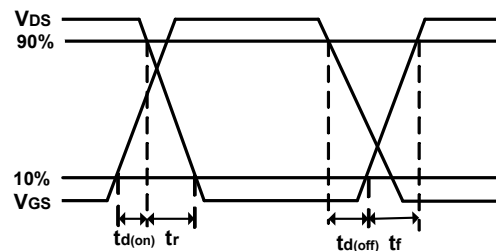
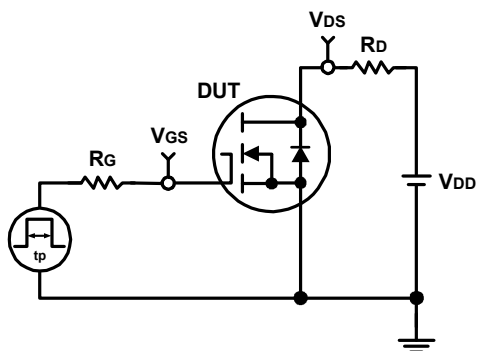
Gate Charge



Avalanche Test Circuit and Waveforms

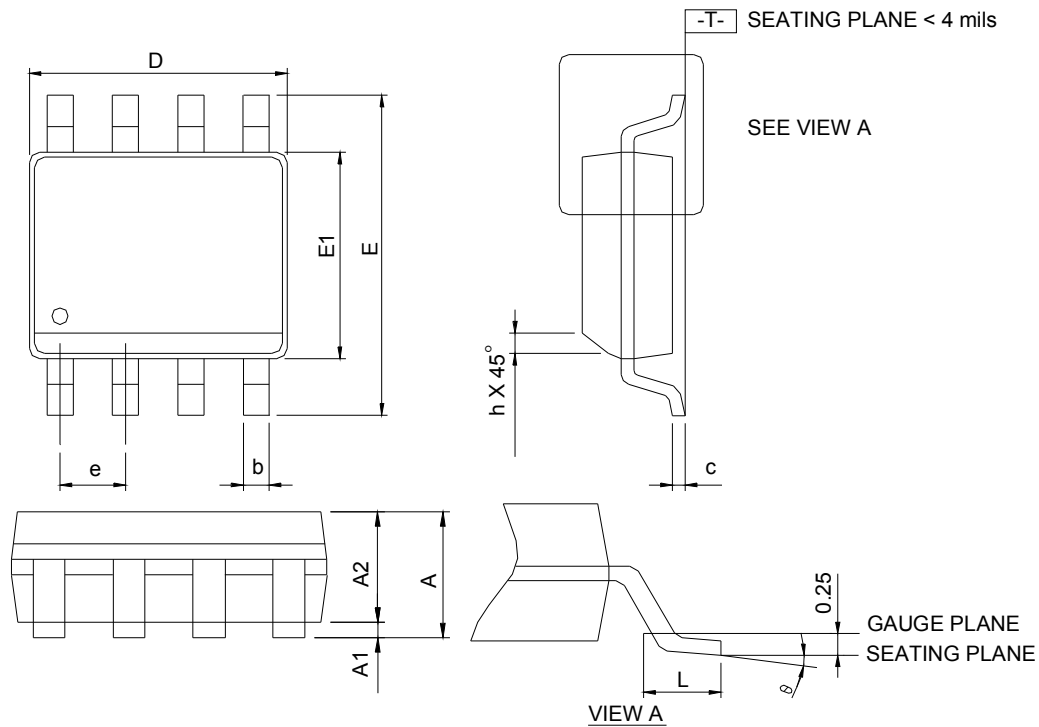


Switching Time Test Circuit and Waveforms



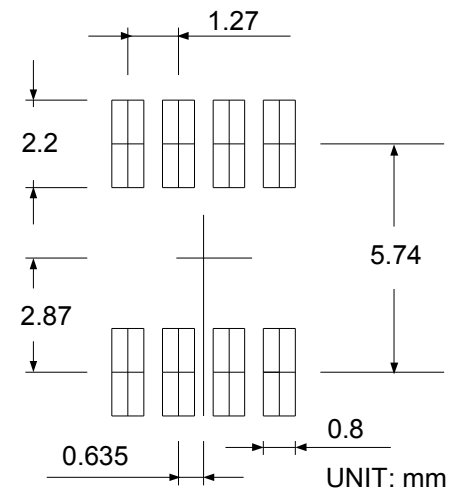
Package Information

SOP-8



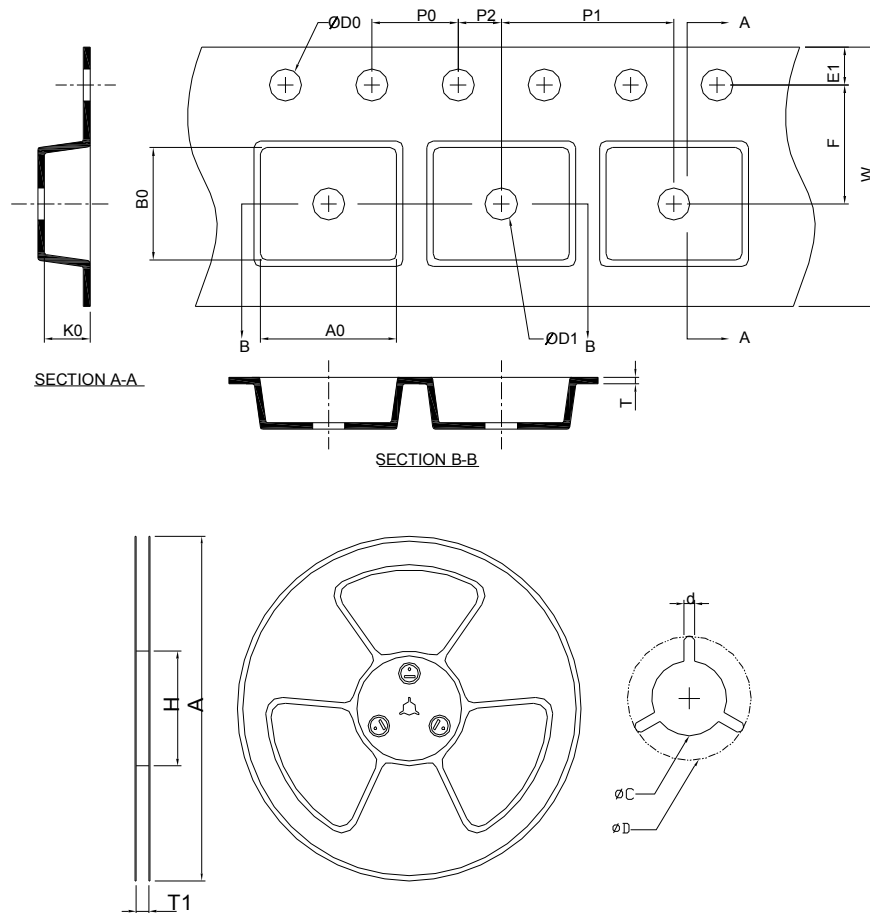
S O P - 8	SOP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.75	-	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	-	0.049	-
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

RECOMMENDED LAND PATTERN



- Note: 1. Follow JEDEC MS-012 AA.
 2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.
 3. Dimension "E" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.

Carrier Tape & Reel Dimensions

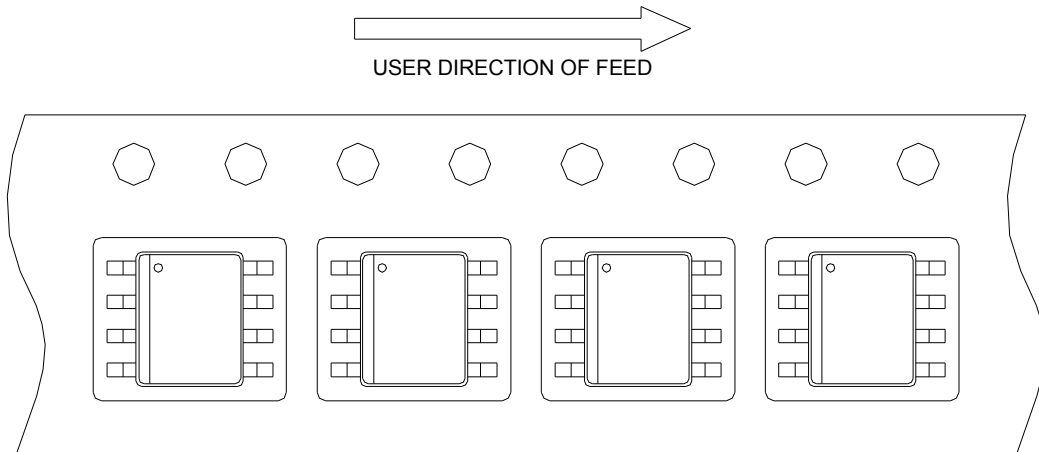


Application	A	H	T1	C	d	D	W	E1	F
SOP-8	330.0 ± 2.00	50 MIN.	$12.4 + 2.00 - 0.00$	$13.0 + 0.50 - 0.20$	1.5 MIN.	20.2 MIN.	12.0 ± 0.30	1.75 ± 0.10	5.5 ± 0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0 ± 0.10	8.0 ± 0.10	2.0 ± 0.05	$1.5 + 0.10 - 0.00$	1.5 MIN.	$0.6 + 0.00 - 0.40$	6.40 ± 0.20	5.20 ± 0.20	2.10 ± 0.20

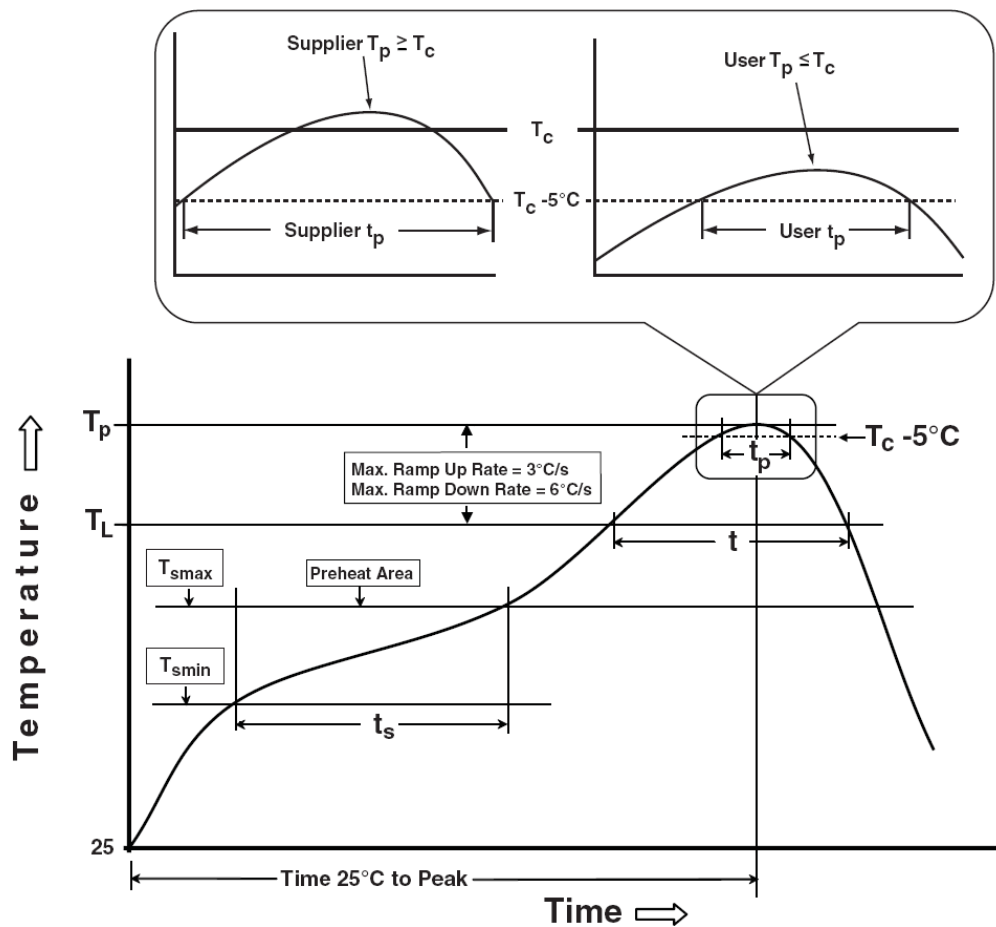
(mm)

Taping Direction Information

SOP-8



Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin})	100 °C	150 °C
Temperature max (T_{smax})	150 °C	200 °C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time at liquidous (t_L)	60-150 seconds	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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