

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C=25^\circ\text{C}$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	60	V	
V_{GSS}	Gate-Source Voltage	± 20		
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	20	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	$T_C=25^\circ\text{C}$	80**	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	20	A
		$T_C=100^\circ\text{C}$	13	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	31.3	W
		$T_C=100^\circ\text{C}$	12.5	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		4.0	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		110	$^\circ\text{C}/\text{W}$
E_{AS}	Drain-Source Avalanche Energy	$L=0.5\text{mH}$	36***	mJ

Note : * Repetitive rating ; pulse width limited by junction temperature

** Drain current is limited by junction temperature

*** $V_D=48\text{V}$

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

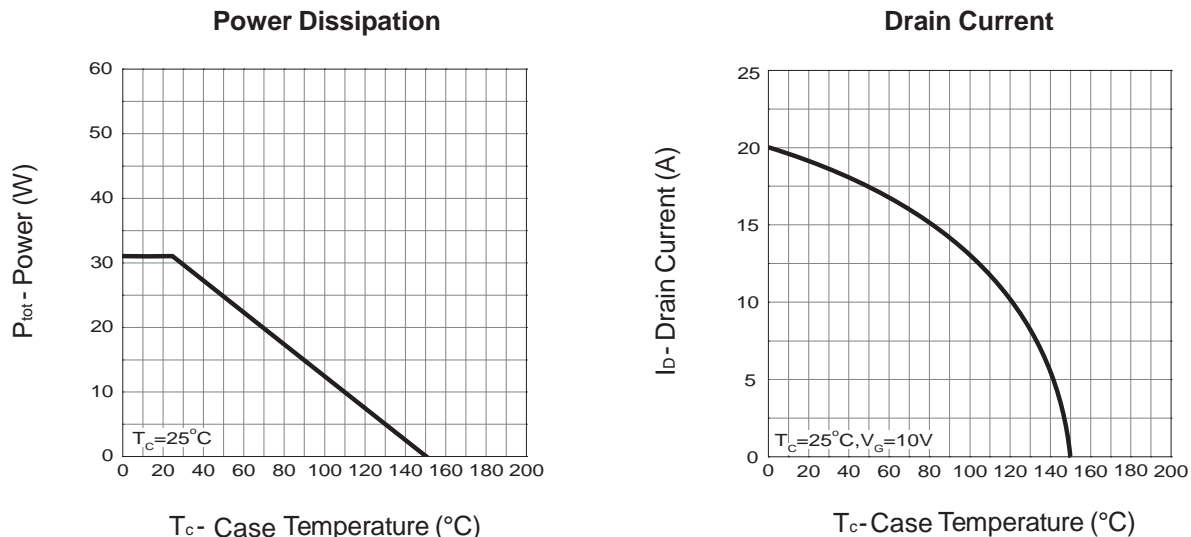
Symbol	Parameter	Test Conditions	HY1206			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_{DS}=250\mu\text{A}$	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu\text{A}$	1.0	2.0	3.0	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$	-	-	± 5	μA
$R_{DS(ON)}^*$	Drain-Source On-state Resistance	$V_{GS}=10\text{V}, I_{DS}=10\text{A}$	-	60	75	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_{DS}=8\text{A}$	-	84	100	$\text{m}\Omega$
Diode Characteristics						
V_{SD}^*	Diode Forward Voltage	$I_{SD}=10\text{A}, V_{GS}=0\text{V}$	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	$I_{DS}=10\text{A}, dI_{SD}/dt=50\text{A}/\mu\text{s}$	-	50	-	ns
Q_{rr}	Reverse Recovery Charge		-	74	-	nC

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

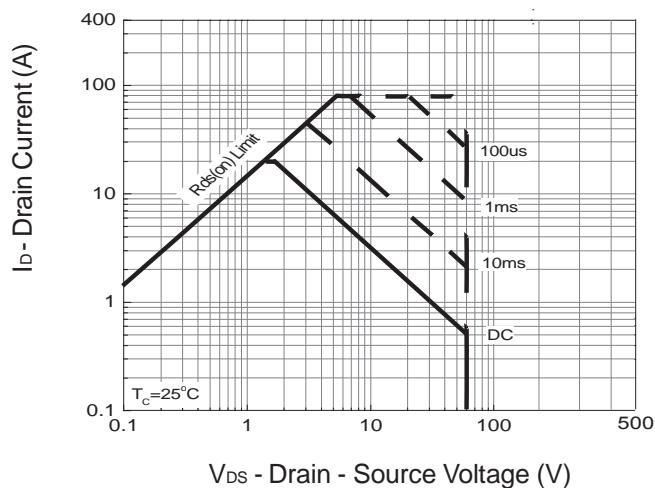
Symbol	Parameter	Test Conditions	HY1206			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	2.0	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	700	-	pF
C_{oss}	Output Capacitance		-	100	-	
C_{rss}	Reverse Transfer Capacitance		-	80	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=30V, R_G=4\Omega,$ $I_{DS}=10A, V_{GS}=10V,$	-	21	-	ns
T_r	Turn-on Rise Time		-	25	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	27	-	
T_f	Turn-off Fall Time		-	31	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	$V_{DS}=48V, V_{GS}=10V,$ $I_{DS}=10A$	-	21	-	nC
Q_{gs}	Gate-Source Charge		-	5	-	
Q_{gd}	Gate-Drain Charge		-	7	-	

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

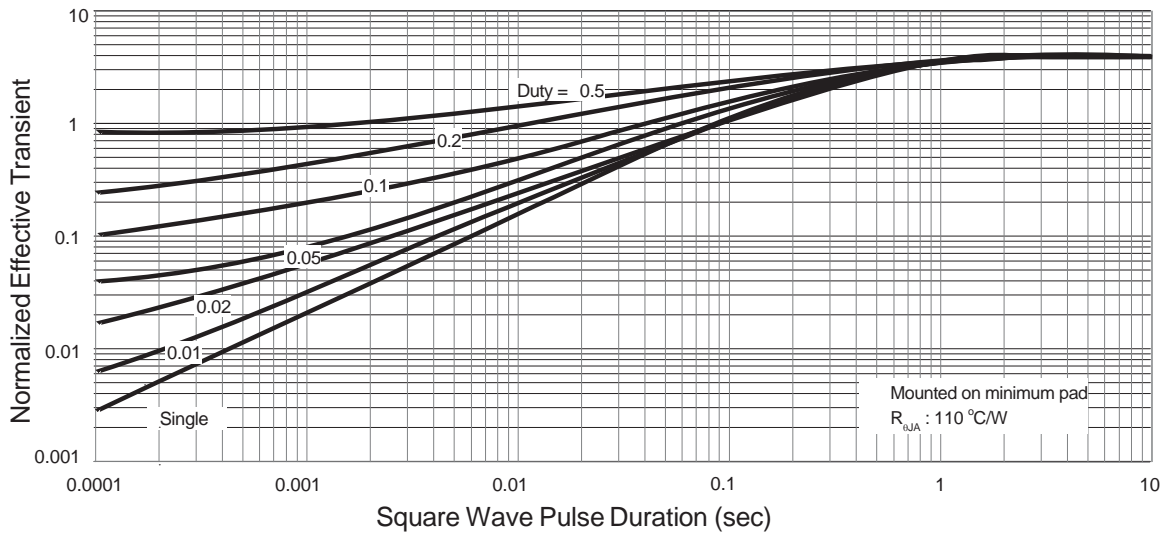
Typical Operating Characteristics



Safe Operation Area

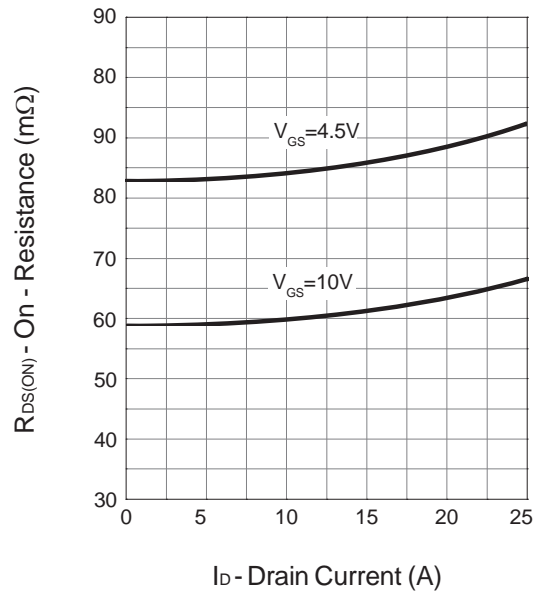
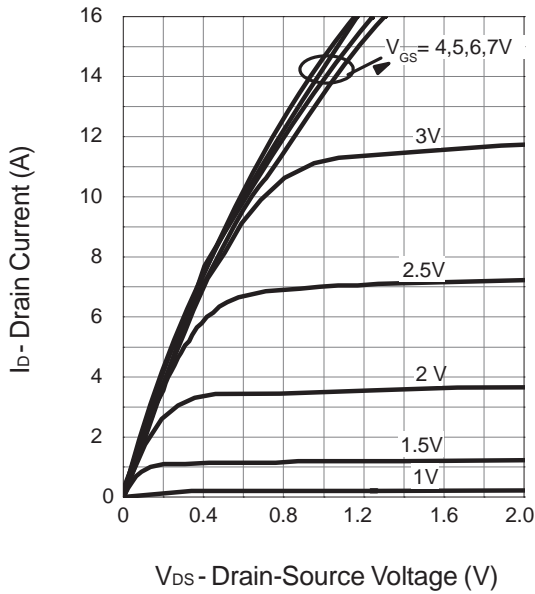


Thermal Transient Impedance

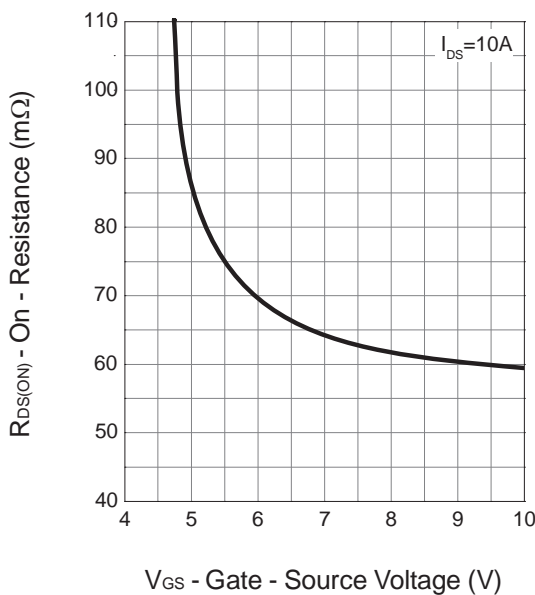


Typical Operating Characteristics (Cont.)

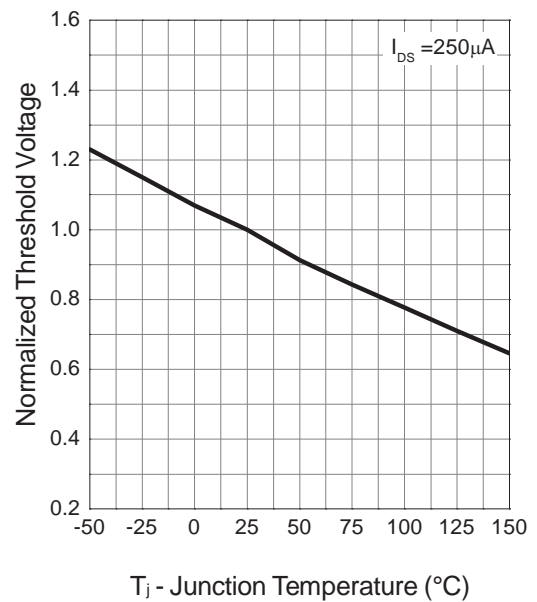
Output Characteristics



Drain-Source On Resistance

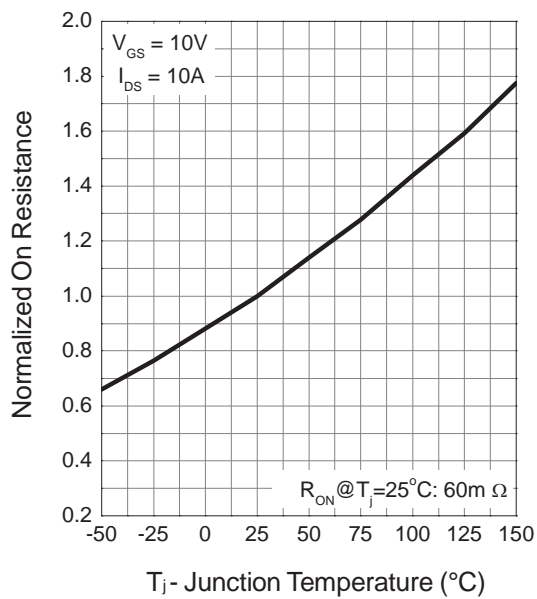


Gate Threshold Voltage

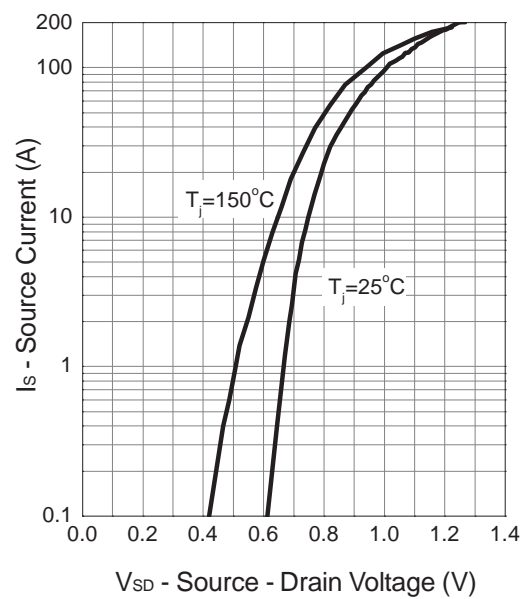


Typical Operating Characteristics (Cont.)

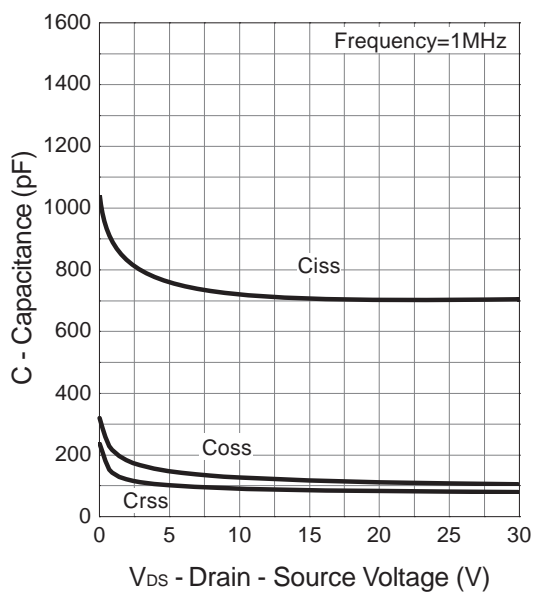
Drain-Source On Resistance



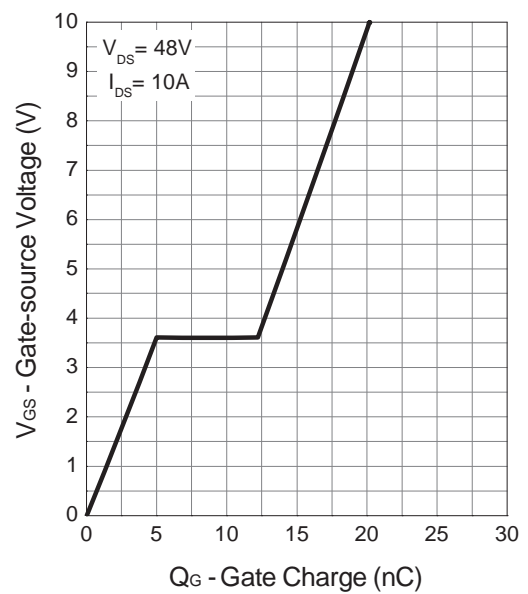
Source-Drain Diode Forward



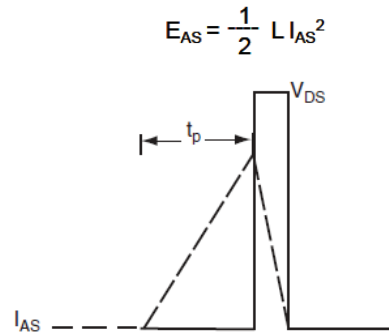
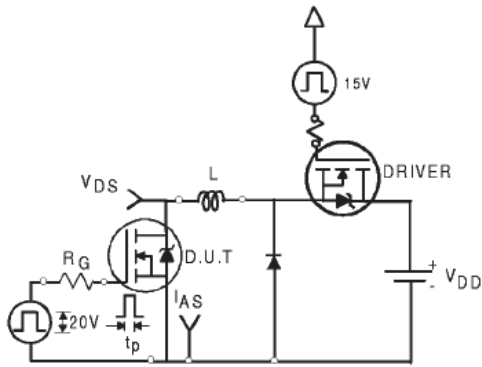
Capacitance



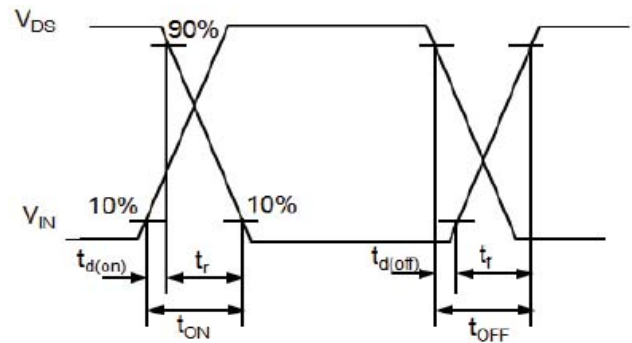
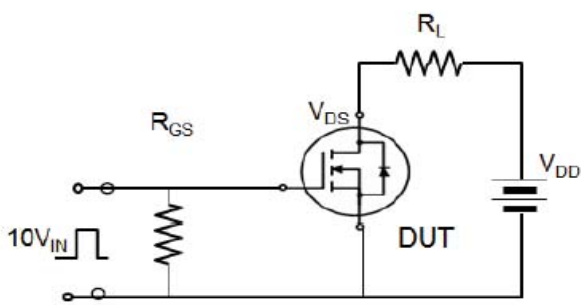
Gate Charge



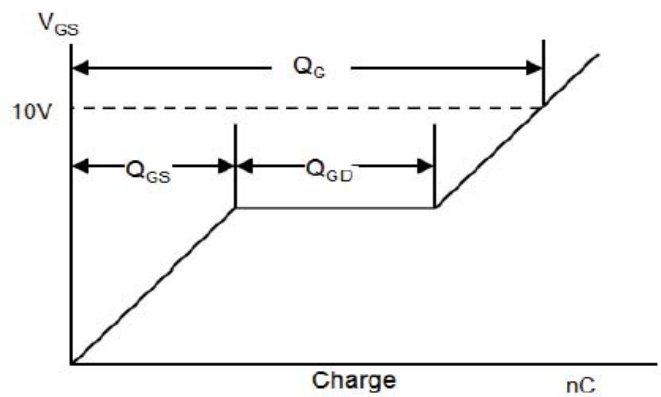
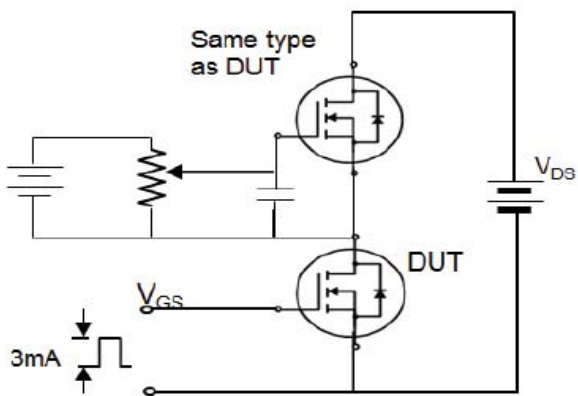
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit



Device Per Unit

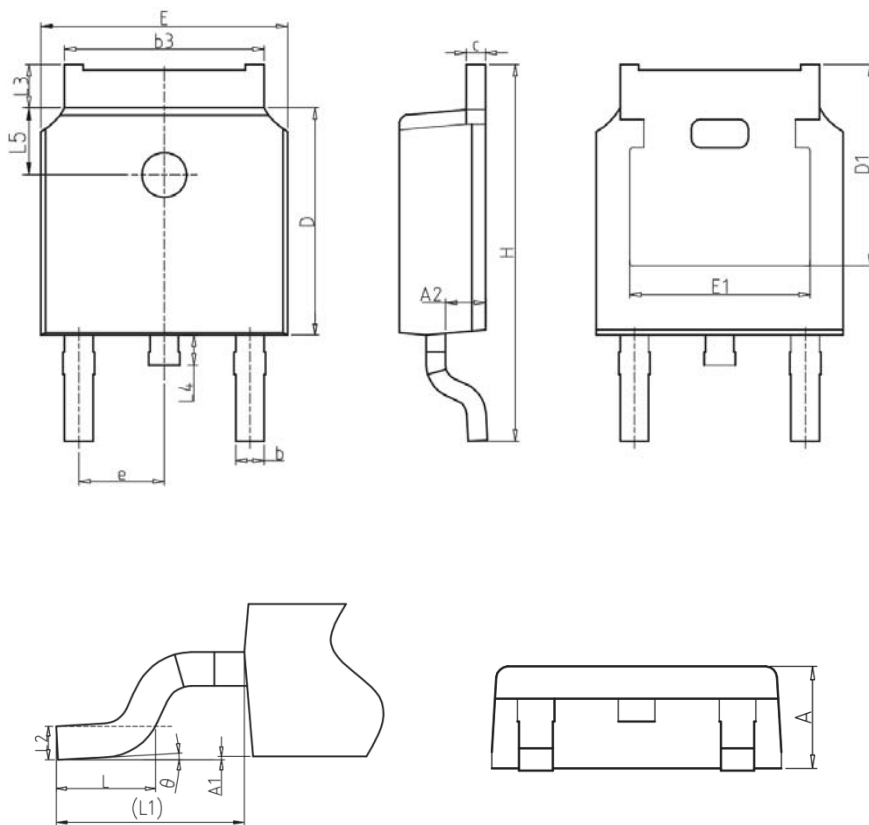
Package Type	Unit	Quantity
TO-252-2L	Tube	75
TO-252-2L	Reel	2500
TO-251-3L	Tube	75
TO-251-3S	Tube	75

Package Information

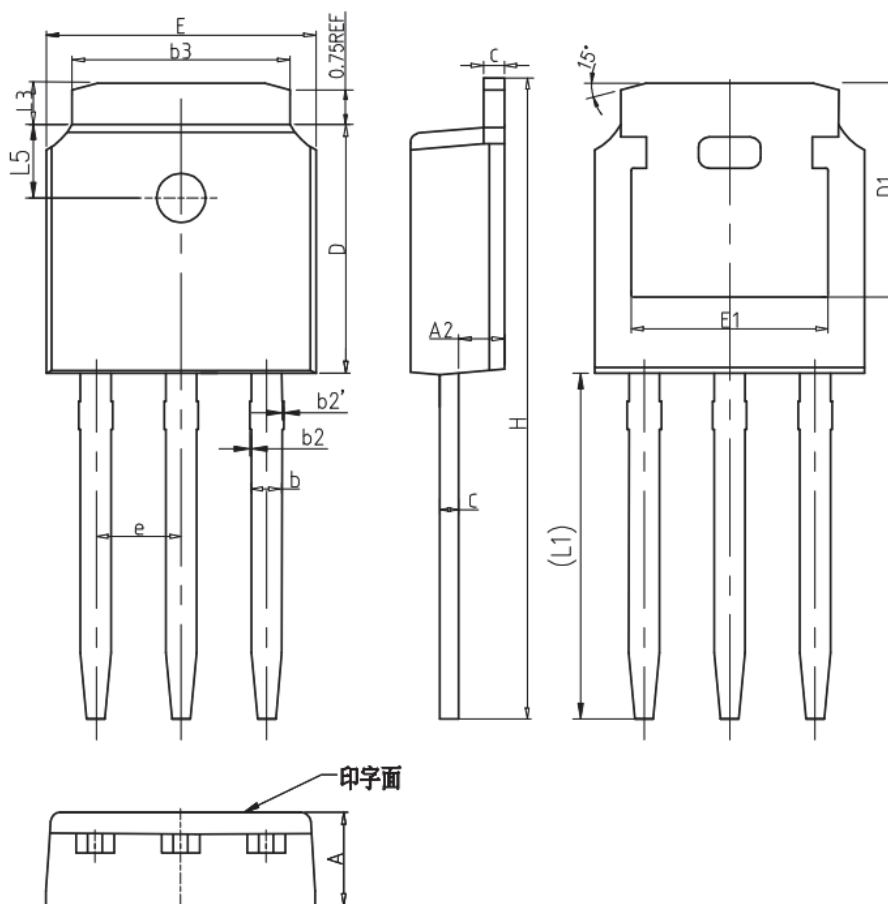
TO-252-2L

COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	-	-	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°



TO-251-3L



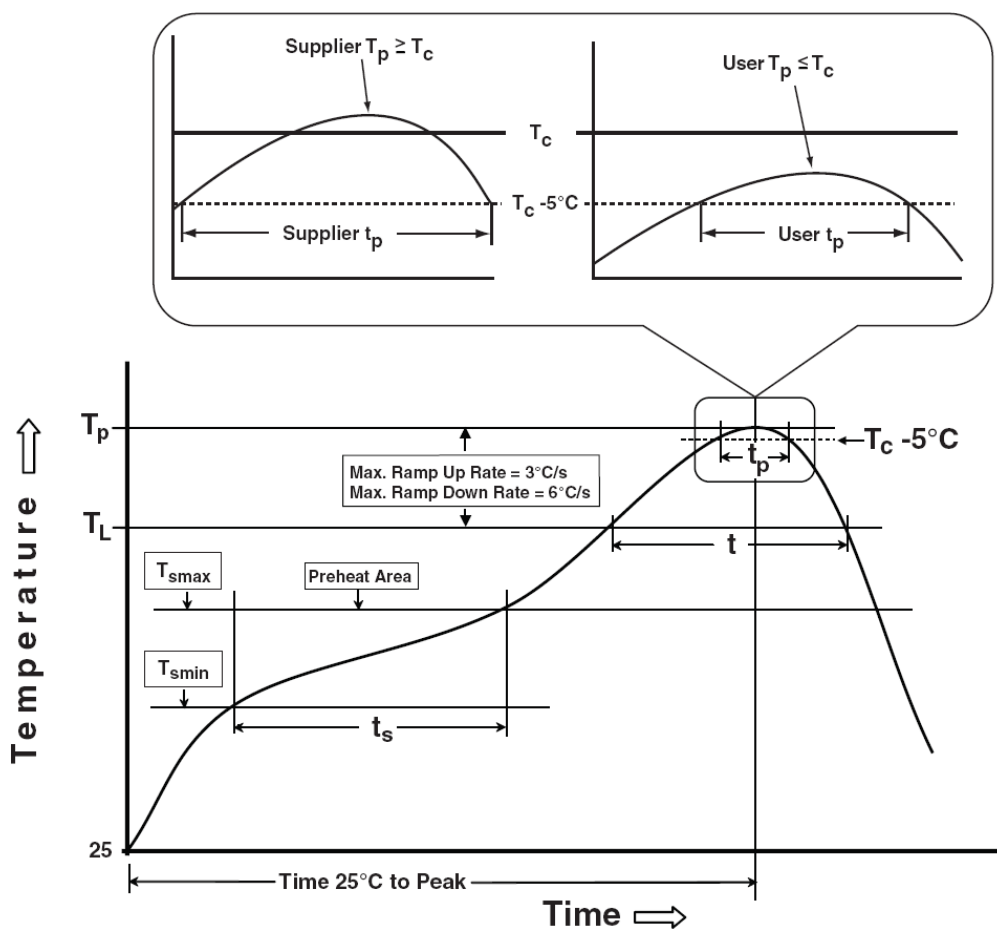
COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b2	0.00	0.04	0.10
b2'	0.00	0.04	0.10
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	16.22	16.52	16.82
L1	9.15	9.40	9.65
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

Devices Per Unit

Package Type	Unit	Quantity
TO-252-3L	Tube	72
TO-251-3L	Tube	72

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 ° 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	168Hrs/500Hrs/H1000Hrs,Bias@125°C
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, - 55°C~150°C

Customer Service

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