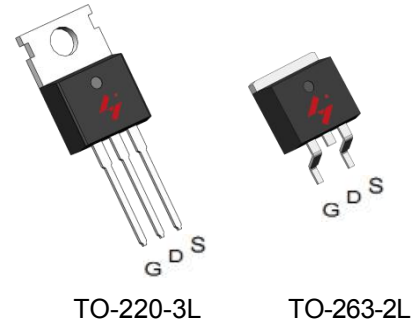


N-Channel Enhancement Mode MOSFET

Feature

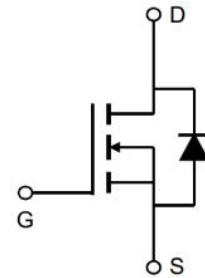
- 200V/36A
 $R_{DS(ON)}=57m\Omega(\text{typ.})@V_{GS} = 10V$
- 100% Avalanche Tested
- Reliable and Rugged
- Lead-Free and Green Devices Available
 (RoHS Compliant)

Pin Description



Applications

- Power Switching application
- Uninterruptible Power Supply



N-Channel MOSFET

Ordering and Marking Information

<div> <div>HM36N20</div> <div>YYWW</div> </div> <div> <div>HM36N20D</div> <div>YYWW</div> </div>	<div> <div>Package Code</div> <div>Blank:TO-220-3L B:TO-263-2L</div> </div> <div> <div>Date Code</div> <div>YYWW</div> </div>
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Note:H&M Semi lead-free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish; which are fully compliant with RoHS.H&M Semi lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J-STD-020 for MSL classification at lead-free peak reflow temperature.H&M Semi defines “Green” to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

H&M Semi reserves the right to make changes, corrections, enhancements, modifications, and improvements to this product and/or to this document at any time without notice.

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		200	V
V _{GSS}	Gate-Source Voltage		±20	V
T _J	Maximum Junction Temperature		175	°C
T _{STG}	Storage Temperature Range		-55 to 175	°C
I _S	Source Current-Continuous(Body Diode)	Tc=25°C	36	A
Mounted on Large Heat Sink				
I _{DM}	Pulsed Drain Current *	Tc=25°C	150	A
I _D	Continuous Drain Current	Tc=25°C	36	A
		Tc=100°C	25	A
P _D	Maximum Power Dissipation	Tc=25°C	180	W
		Tc=100°C	90	W
R _{θJC}	Thermal Resistance, Junction-to-Case		0.83	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient **		62	°C/W
E _{AS}	Single Pulsed-Avalanche Energy ***	L=0.3mH	273	mJ

Note: * Repetitive rating; pulse width limited by max. junction temperature.
 ** Surface mounted on FR-4 board.
 *** Limited by T_{Jmax}, starting T_J=25°C, L = 0.3mH, V_{DS}=100V, V_{GS}=10V.

Electrical Characteristics(Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HM36N20			Unit
			Min	Typ.	Max	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	200	-	-	V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} =200V, V _{GS} =0V	-	-	1.0	μA
		T _J =125°C	-	-	50	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	3.0	3.8	5.0	V
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)*}	Drain-Source On-State Resistance	V _{GS} =10V, I _{DS} =30A	-	57	68	mΩ
Diode Characteristics						
V _{SD} *	Diode Forward Voltage	I _{SD} =30A, V _{GS} =0V	-	0.85	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =30A, dI _{SD} /dt=100A/μs	-	48	-	ns
Q _{rr}	Reverse Recovery Charge		-	78	-	nC

Electrical Characteristics (Cont.) (Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HY36N20			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1 MHz	-	2.6	-	Ω
C _{iSS}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, Frequency=1.0MHz	-	2444	-	pF
C _{oSS}	Output Capacitance		-	129	-	
C _{rSS}	Reverse Transfer Capacitance		-	24	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =100V, R _G =2.5Ω, I _{DS} =30A, V _{GS} =10V	-	30	-	ns
T _r	Turn-on Rise Time		-	20	-	
t _{d(OFF)}	Turn-off Delay Time		-	21	-	
T _f	Turn-off Fall Time		-	31	-	
Gate Charge Characteristics						
Q _g	Total Gate Charge	V _{DS} 100V, V _{GS} =10V, I _D =20A	-	53	-	nC
Q _{gs}	Gate-Source Charge		-	11	-	
Q _{gd}	Gate-Drain Charge		-	16.5	-	

Note: *Pulse test, pulse width ≤ 300us, duty cycle ≤ 2%

Typical Operating Characteristics

Figure 1: Power Dissipation

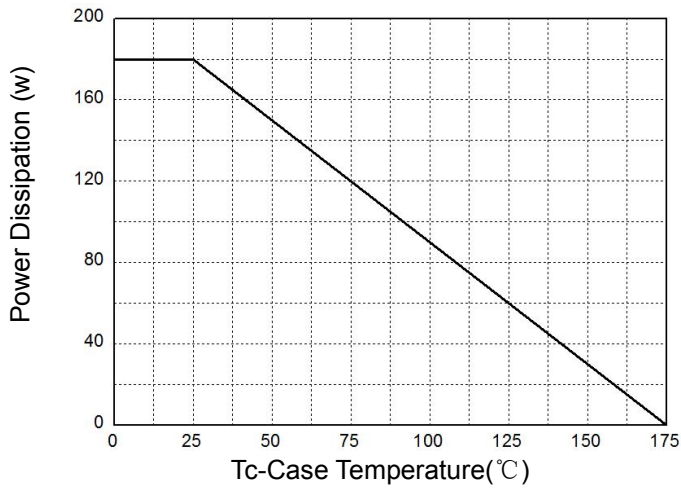


Figure 2: Drain Current

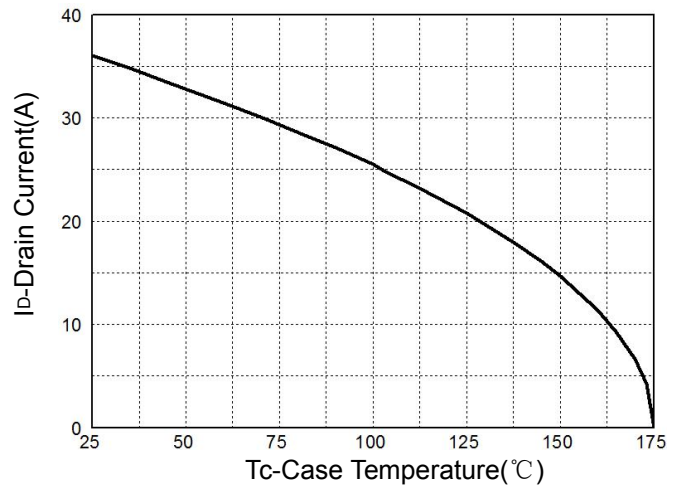


Figure 3: Safe Operation Area

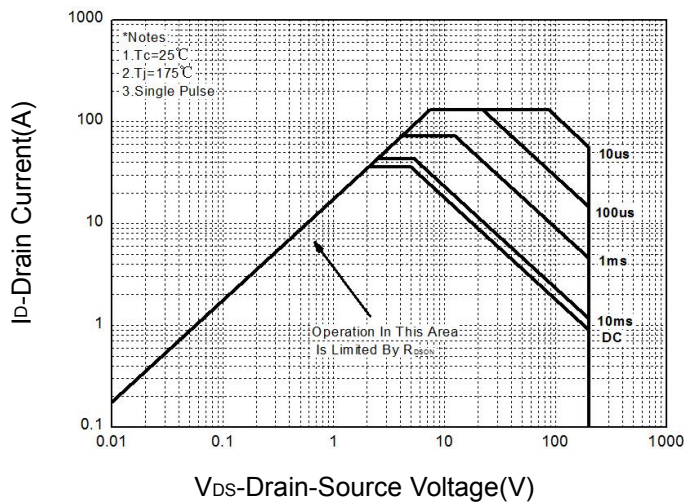


Figure 4: Thermal Transient Impedance

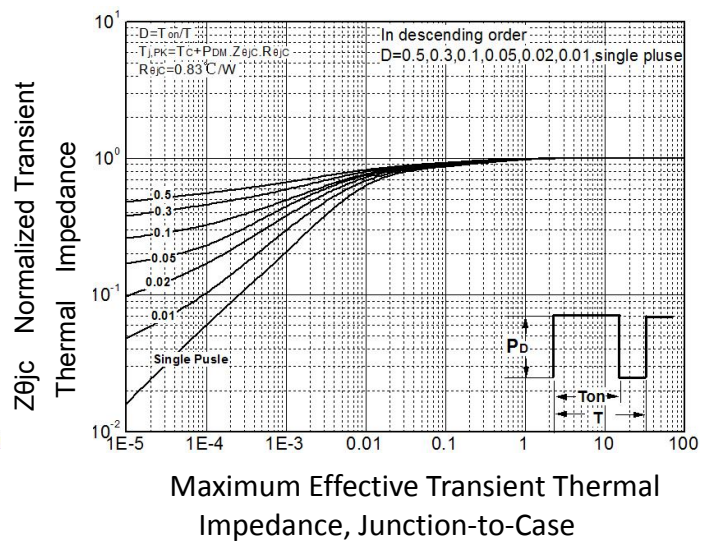


Figure 5: Output Characteristics

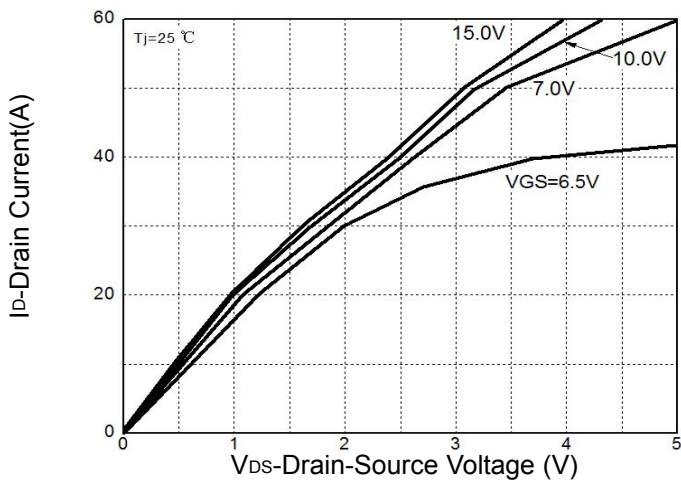
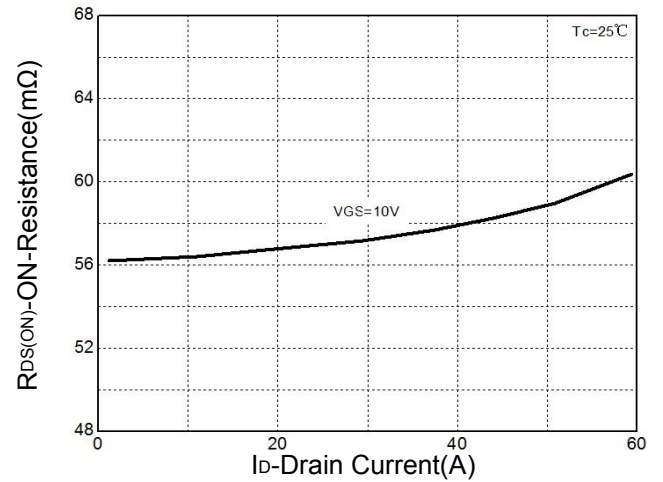


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

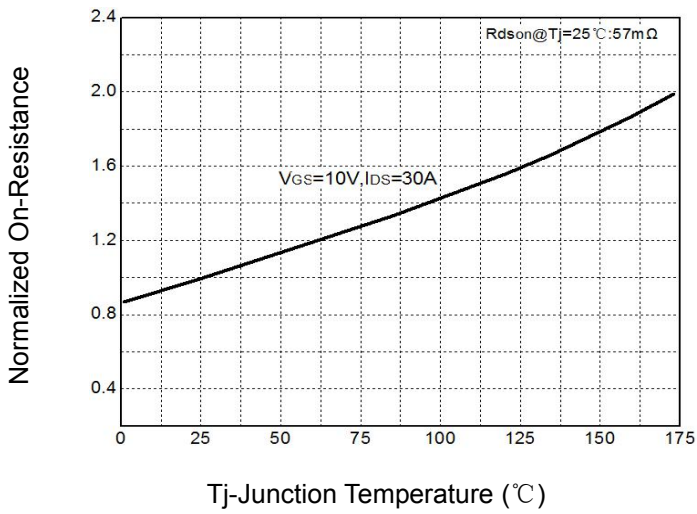


Figure 8: Source-Drain Diode Forward

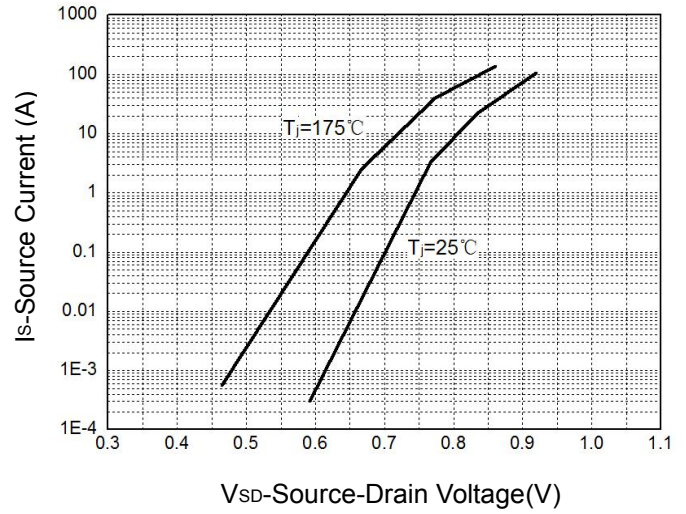


Figure 9: Capacitance Characteristics

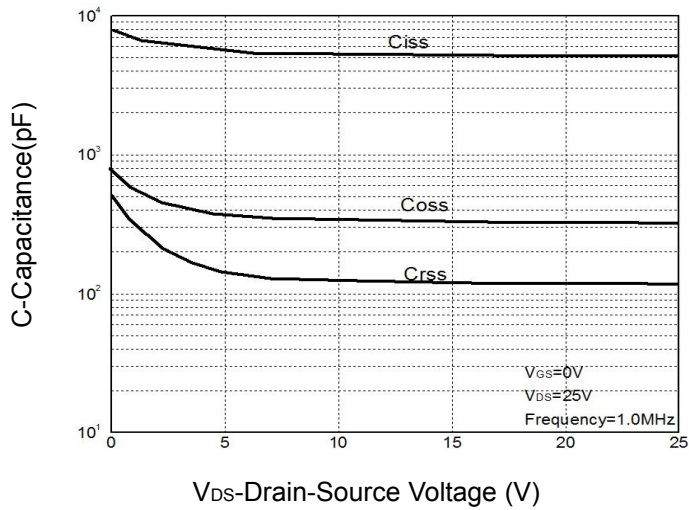
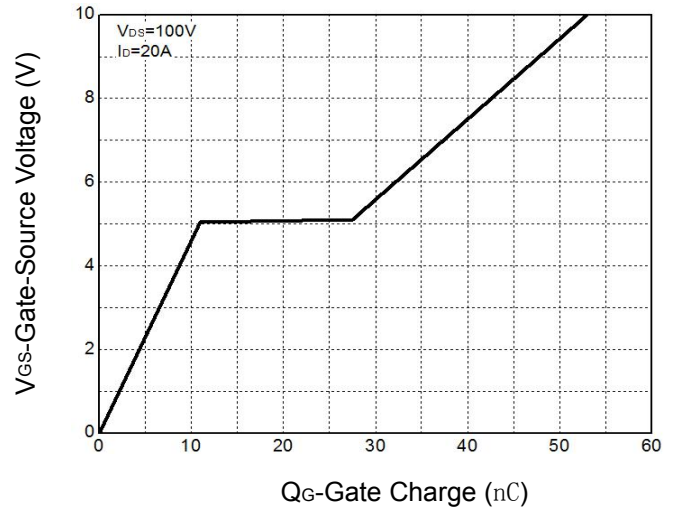
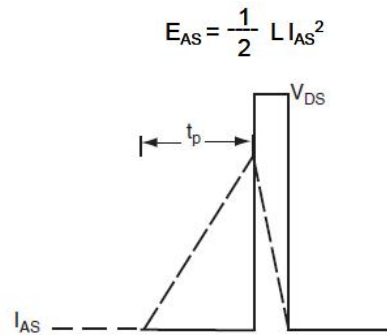
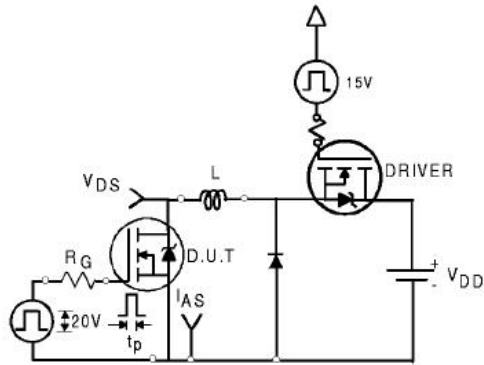


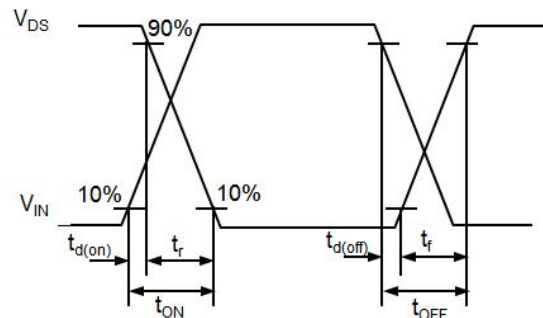
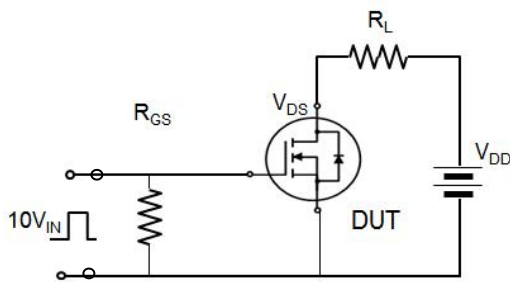
Figure 10: Gate Charge Characteristics



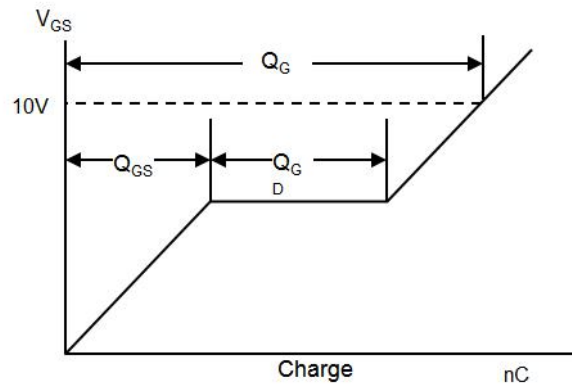
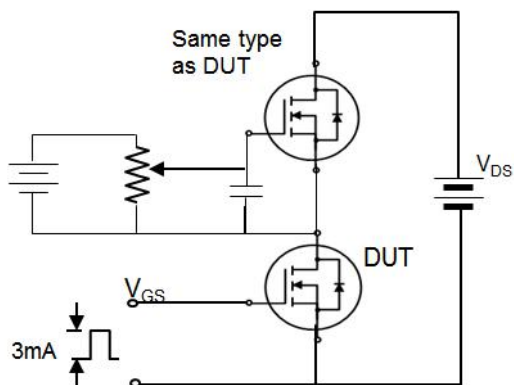
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit

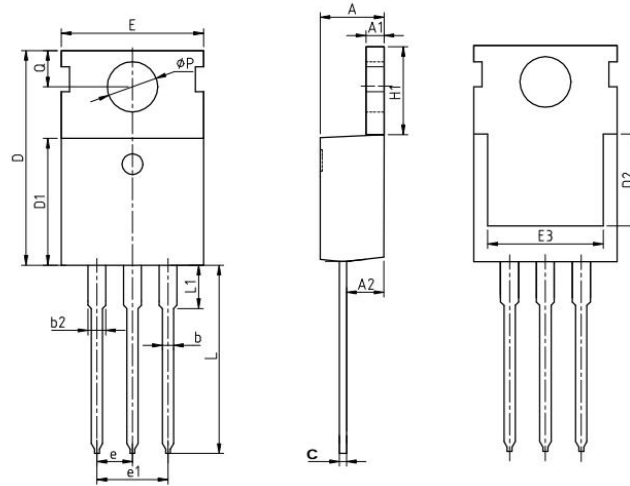


Device Per Unit

Package Type	Unit	Quantity
TO-220-3L	Tube	50
TO-263-2L	Tube	50

Package Information

TO-220-3L



COMMON DIMENSIONS

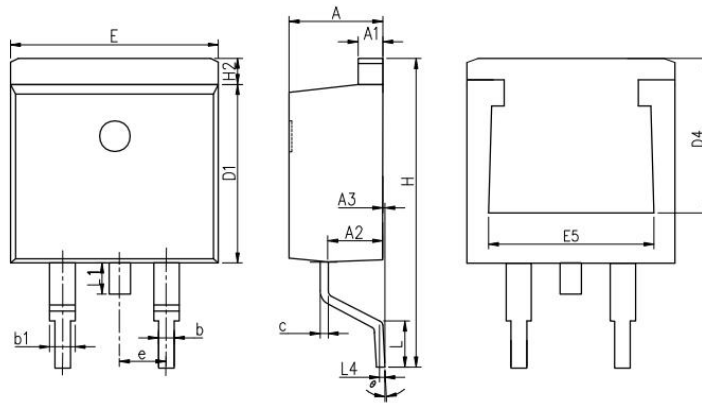
SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

Device Per Unit

Package Type	Unit	Quantity
TO-263-2L	Tube	50

Package Information

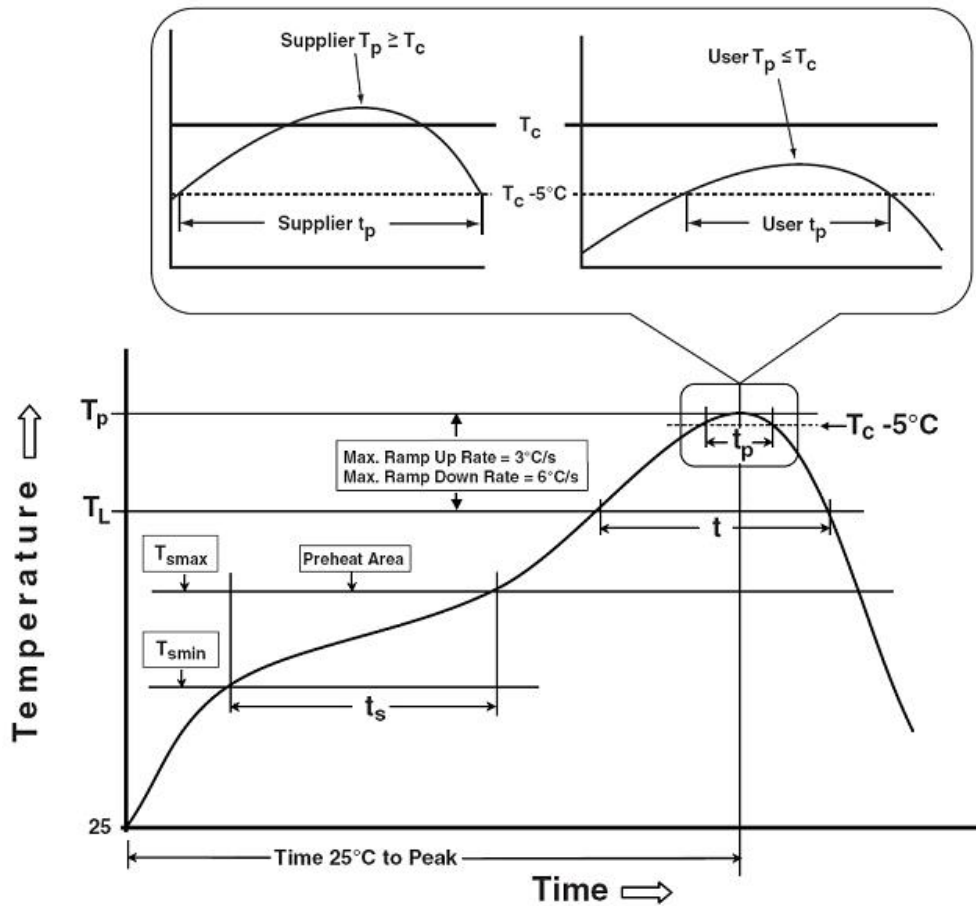
TO-263-2L



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0	0.13	0.25
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D1	8.5	8.7	8.9
D4	6.6	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.7	15.1	15.5
H2	1.07	1.27	1.47
L	2	2.3	2.6
L1	1.4	1.55	1.7
L4	0.25 BSC		
θ	0°	5°	9°

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.