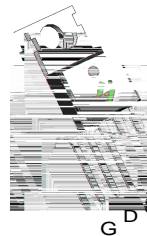


N-Channel Enhancement Mode MOSFET

Features

- 60V/230A
 $R_{DS(ON)} = 2.6\text{ m}\Omega$ (typ.) @ $V_{GS} = 10\text{V}$
- 100% avalanche tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

Pin Description



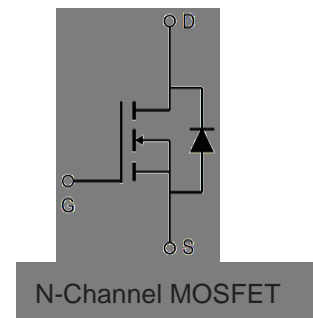
TO-220FB-3L



TO-263-2L

Applications

- Switching application
- Power Management for Inverter Systems.



Ordering and Marking Information

		Package Code P : TO-220FB-3L B: TO-263-2L	Assembly Material G : Lead Free Device
Date Code YYXXX JWW G	Date Code YYXXX WW		

Note: HUAYI lead-free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish; which are fully compliant with RoHS. HUAYI 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. HUAYI 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).

HUAYI 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 ($T_C=25^\circ\text{C}$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	60	V	
V_{GSS}	Gate-Source Voltage	± 25		
T_J	Maximum Junction Temperature	175	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	230	A
Mounted on Large Heat Sink				
I_{DM}		$T_C=25^\circ\text{C}$	880**	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	230	A
		$T_C=100^\circ\text{C}$	155	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	258	W
		$T_C=100^\circ\text{C}$	129	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.58	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	
Avalanche Ratings				
E_{AS}	Avalanche Energy, Single Pulsed	$L=0.5\text{mH}$	1.4***	J

Note :

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

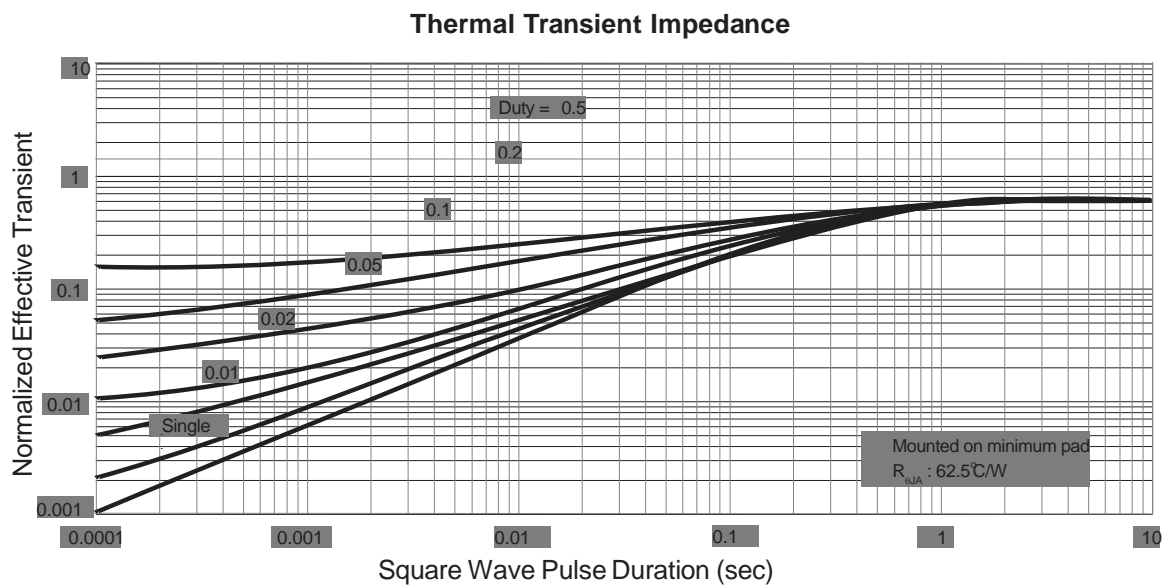
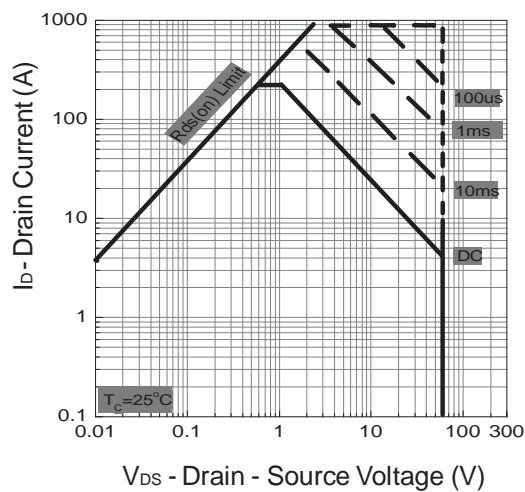
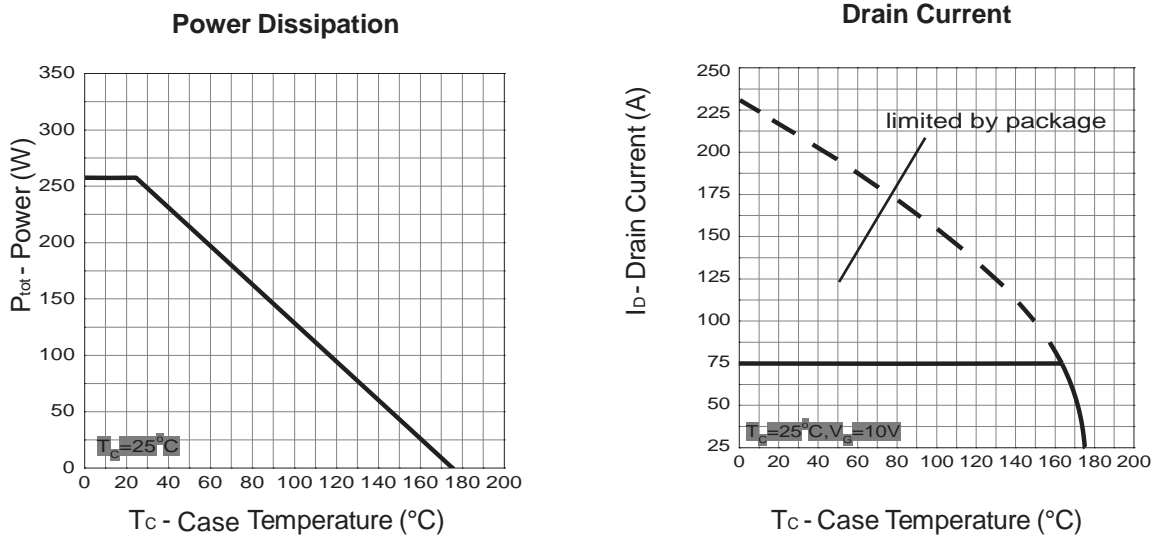
Symbol	Parameter	Test Conditions	HY4306			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_{DS}=250\mu\text{A}$	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	10	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu\text{A}$	2.0	3.0	4.0	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25\text{V}, V_{DS}=0\text{V}$	-	-	± 100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10\text{V}, I_{DS}=115\text{A}$	-	2.6	3.0	$\text{m}\Omega$
Diode Characteristics						
V_{SD}	Diode Forward Voltage	$I_{SD}=115\text{A}, V_{GS}=0\text{V}$	-	0.8	1.2	V

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

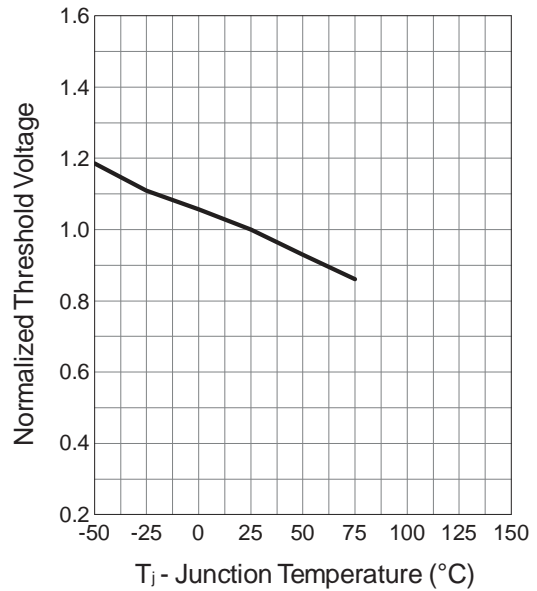
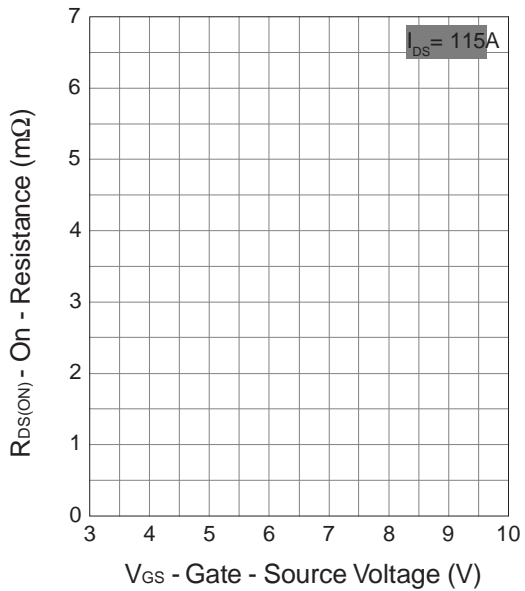
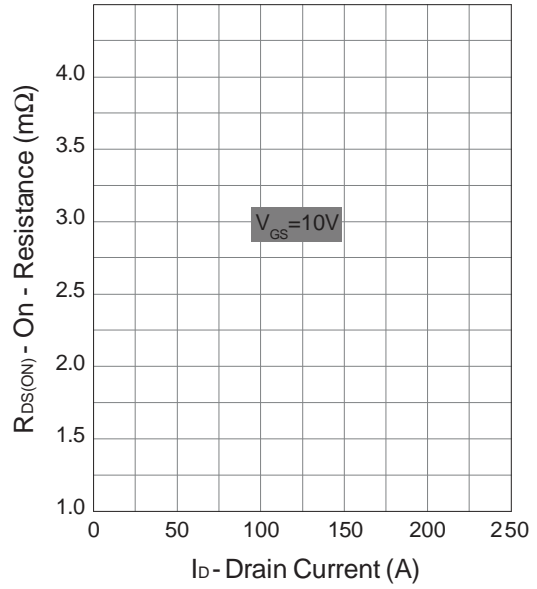
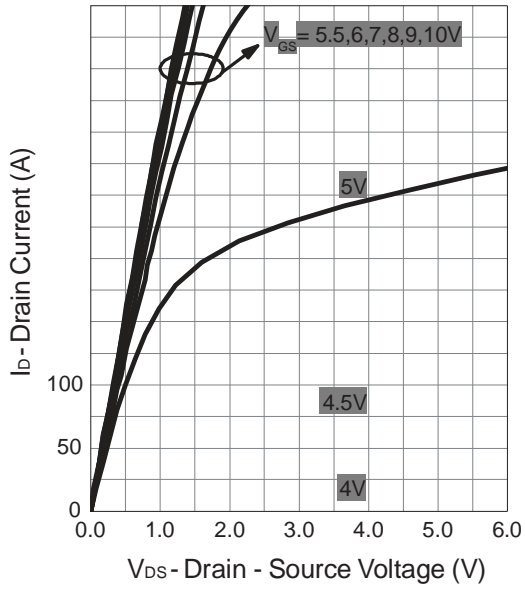
Symbol	Parameter	Test Conditions	HY4306			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	2.2	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	7219	-	pF
C_{oss}	Output Capacitance		-	1093	-	
C_{rss}	Reverse Transfer Capacitance		-	558	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=30V, R_G=6\ \Omega,$ $I_{DS}=115A, V_{GS}=10V,$	-	26	-	ns
T_r	Turn-on Rise Time		-	18	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	40	-	
T_f	Turn-off Fall Time		-	54	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	$V_{DS}=48V, V_{GS}=10V,$ $I_{DS}=115A$	-	171	-	nC
Q_{gs}	Gate-Source Charge		-	30	-	
Q_{gd}	Gate-Drain Charge		-	63	-	

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

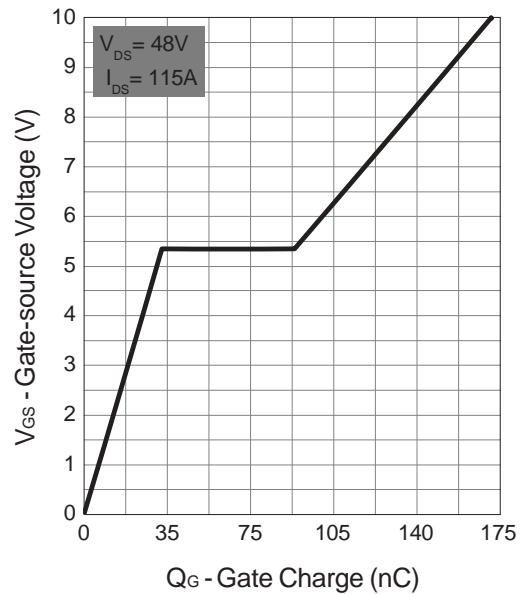
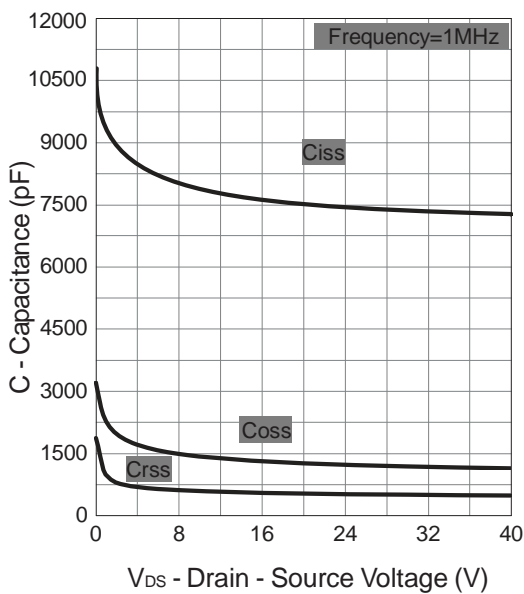
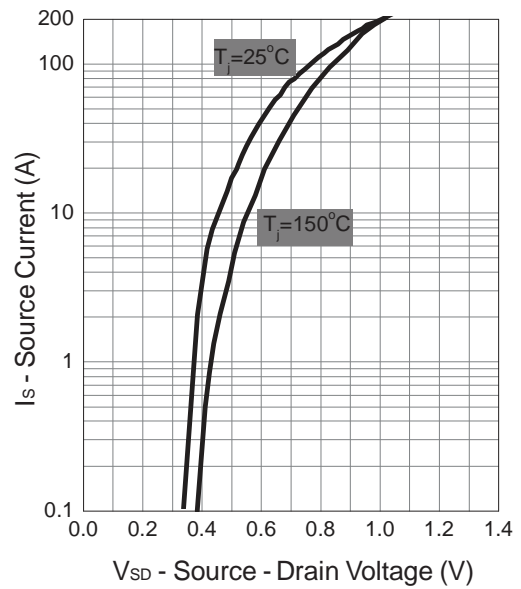
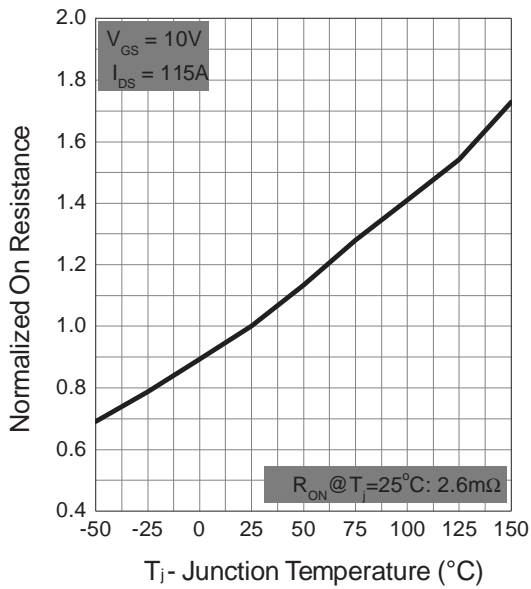
Typical Operating Characteristics



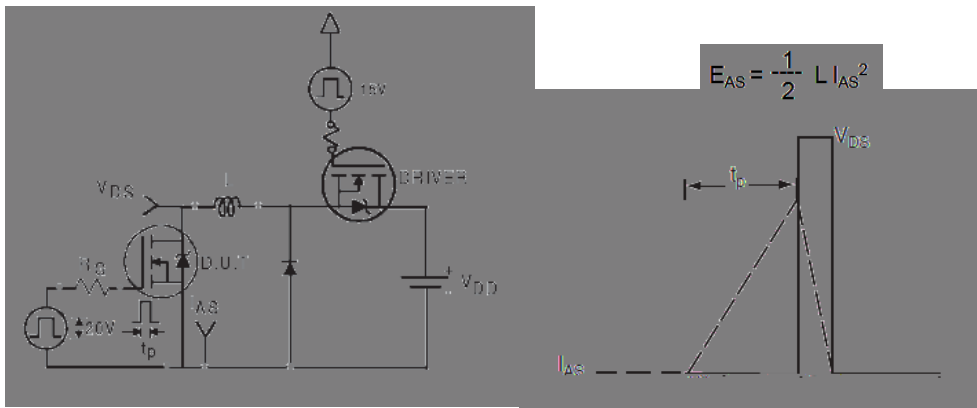
Typical Operating Characteristics (Cont.)



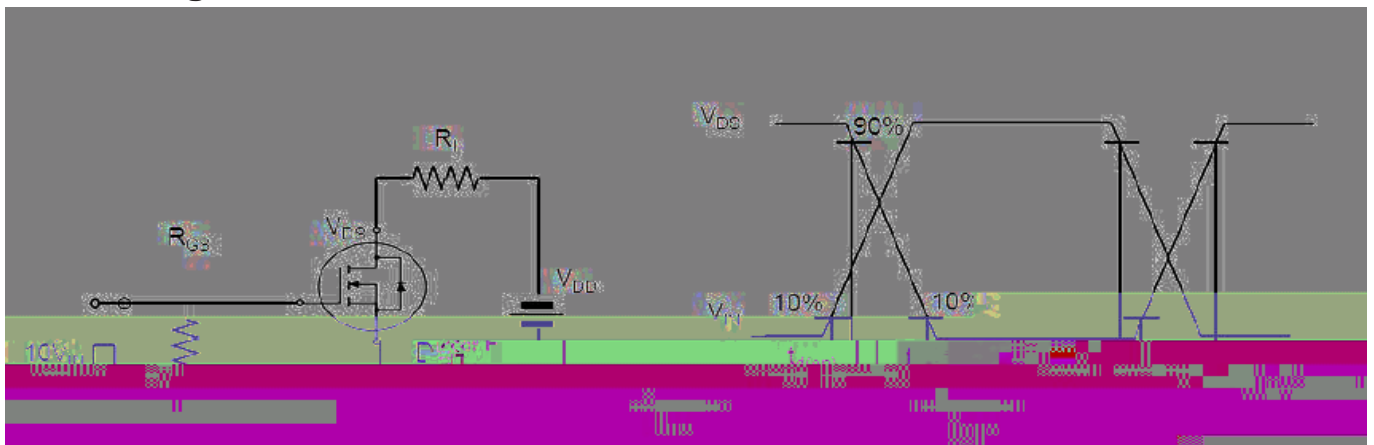
Typical Operating Characteristics (Cont.)



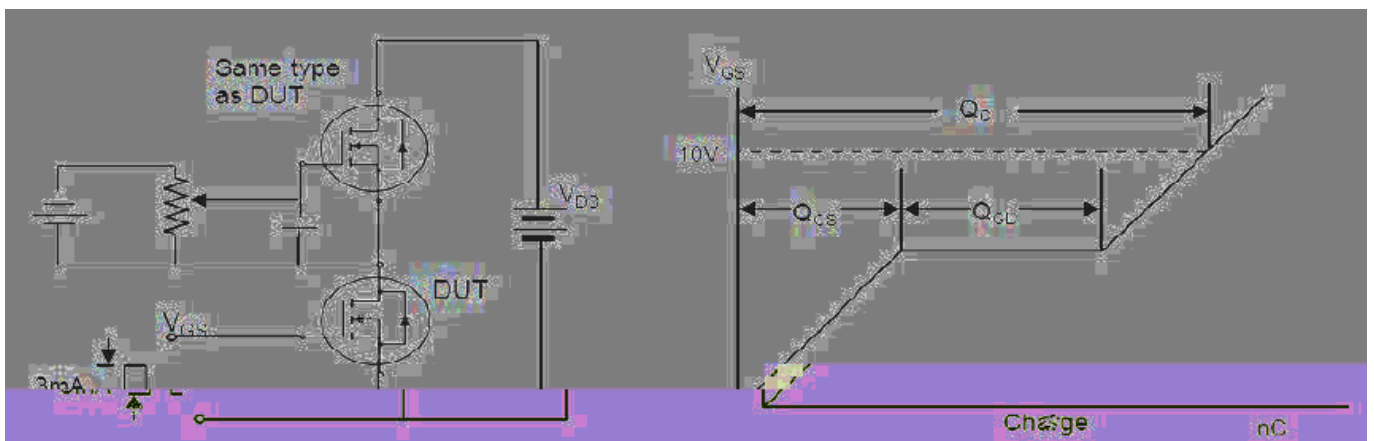
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit

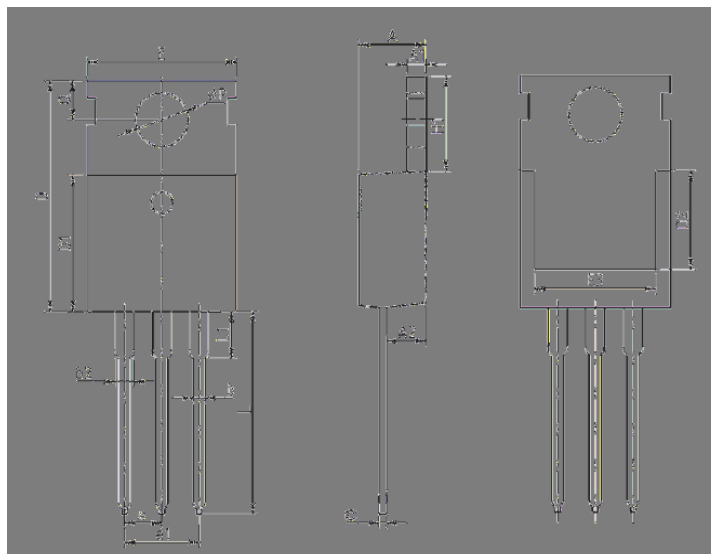


Device Per Unit

Package Type	Unit	Quantity
TO-220FB-3L	Tube	50

Package Information

TO-220FB-3L

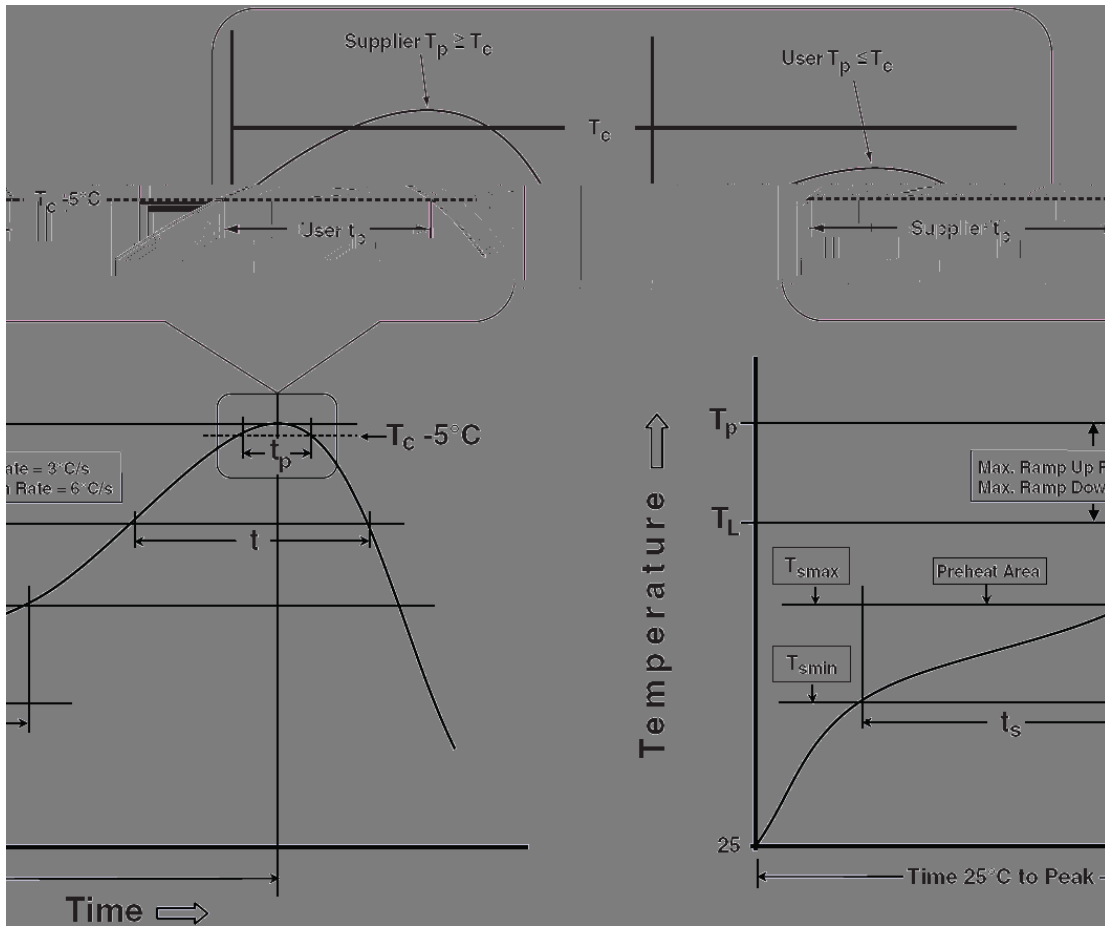


COMMON DIMENSIONS

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

HY4306P/B

Classification Profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
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Table 2. Pb-free Process – Classification Temperatures (Tc)

Package Thickness	Volume mm³ <350	Volume mm³ 350-2000	Volume mm³ >2000
<1.6 mm	260 °C	260 °C	260 °C