

MT3113/B

N-Channel 125V/130A Power MOSFET

Features

- Typ $R_{DS(on)}=7.7m\Omega / V_{GS}=10V, I_D=65A$
- Fast Switching Speed
- Low Gate Charge
- 100% avalanche tested

General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

Applications

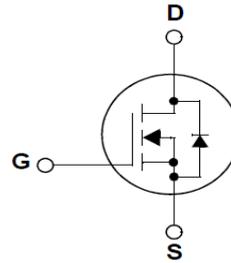
- DC-DC primary bridge
- DC-DC Synchronous rectification
- Power Management for Inverter Systems



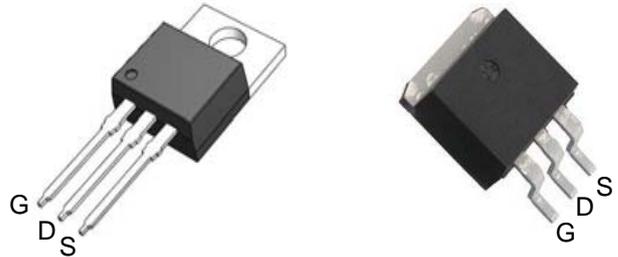
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Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



		<p>Package Code</p> <p>MT3113: T0-220FB-3L MT3113B: T0-263-2L</p>
		<p>Date Code Lot No</p> <p> PYWWM XX</p>

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C=25^\circ C$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	125	V	
V_{GSS}	Gate-Source Voltage	± 25		
T_J	Maximum Junction Temperature	175	$^\circ C$	
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ C$	130	A

Mounted on Large Heat Sink

I_{DM}	Pulsed Drain Current *	$T_C=25^\circ\text{C}$	410**	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	130	A
		$T_C=100^\circ\text{C}$	93	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	278	W
		$T_C=100^\circ\text{C}$	139	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.54	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	
Avalanche Ratings				
E_{AS}	Avalanche Energy, Single Pulsed	$L=0.5\text{mH}$	720***	mJ

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

** Drain current is limited by junction temperature

*** $V_D=90\text{V}$

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

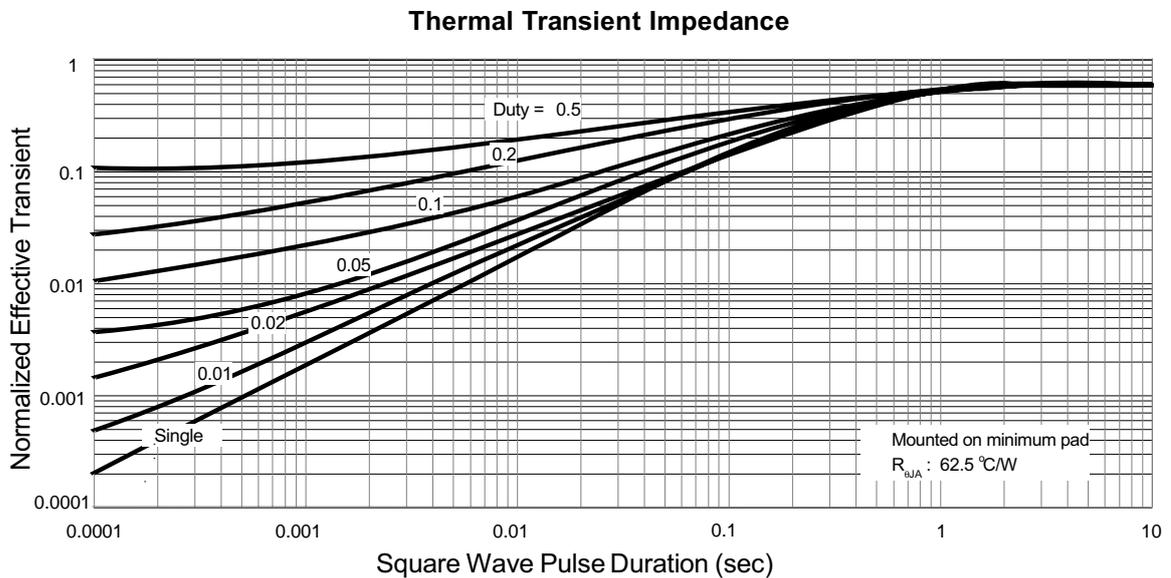
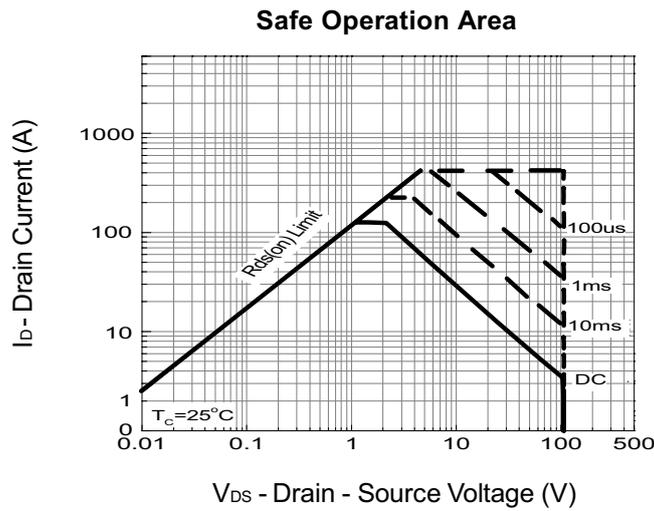
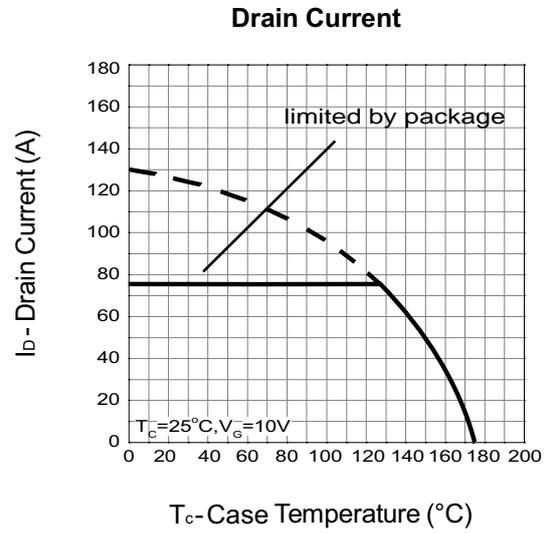
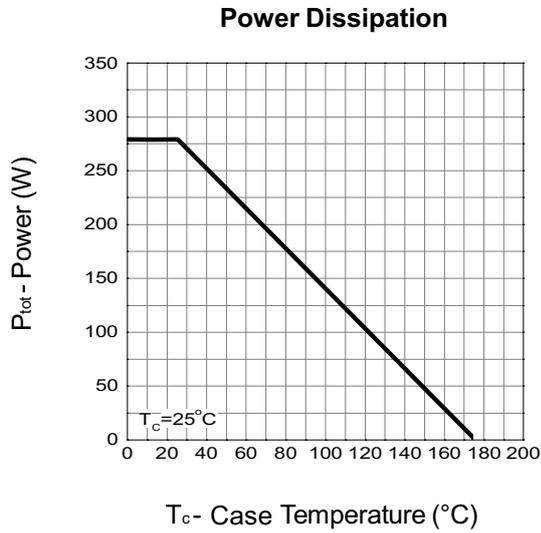
Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_{DS}=250\mu\text{A}$	125	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=125\text{V}, V_{GS}=0\text{V}$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	10	
$V_{GS(th)}$	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	$V_{GS}=10\text{V}, I_{DS}=65\text{A}$	-	7.7	9.0	$\text{m}\Omega$
Diode Characteristics						
V_{SD}^*	Diode Forward Voltage	$I_{SD}=65\text{A}, V_{GS}=0\text{V}$	-	0.8	1	V
t_{rr}	Reverse Recovery Time	$I_{SD}=65\text{A}, dI_{SD}/dt=100\text{A}/\mu\text{s}$	-	65	-	ns
Q_{rr}	Reverse Recovery Charge		-	103	-	nC

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

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.9	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	5896	-	pF
C_{oss}	Output Capacitance		-	940	-	
C_{rss}	Reverse Transfer Capacitance		-	432	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=62.5\text{ V}, R_G=6\ \Omega,$ $I_{DS}=65A, V_{GS}=10V,$	-	23	-	ns
T_r	Turn-on Rise Time		-	39	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	86	-	
T_f	Turn-off Fall Time		-	46	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	$V_{DS}=100\text{ V}, V_{GS}=10V,$ $I_{DS}=65A$	-	130	-	nC
Q_{gs}	Gate-Source Charge		-	25	-	
Q_{gd}	Gate-Drain Charge		-	42	-	

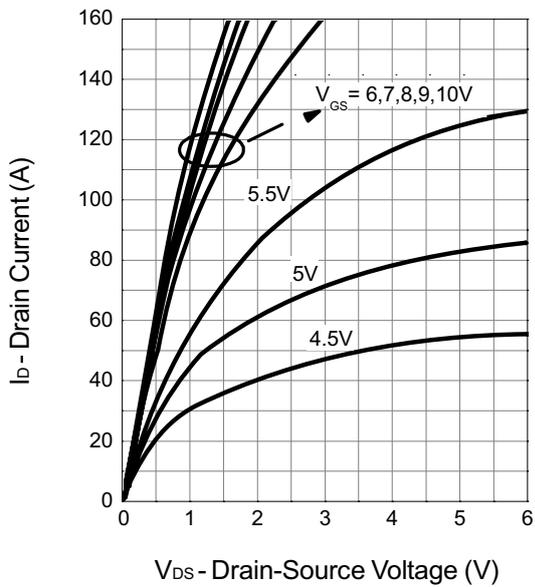
Note * : Pulse test ; pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

Typical Operating Characteristics

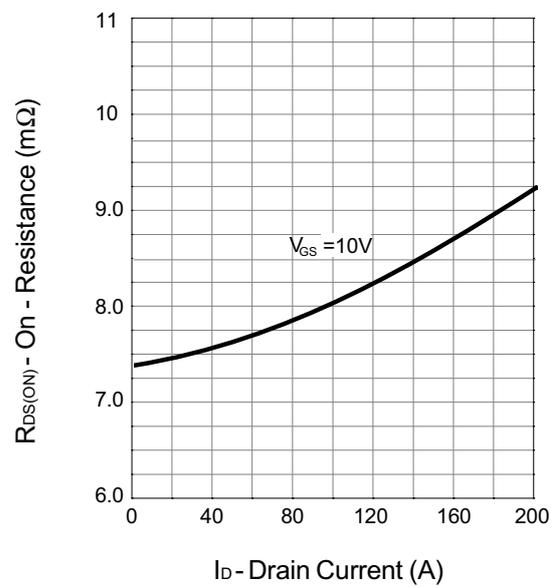


Typical Operating Characteristics (Cont.)

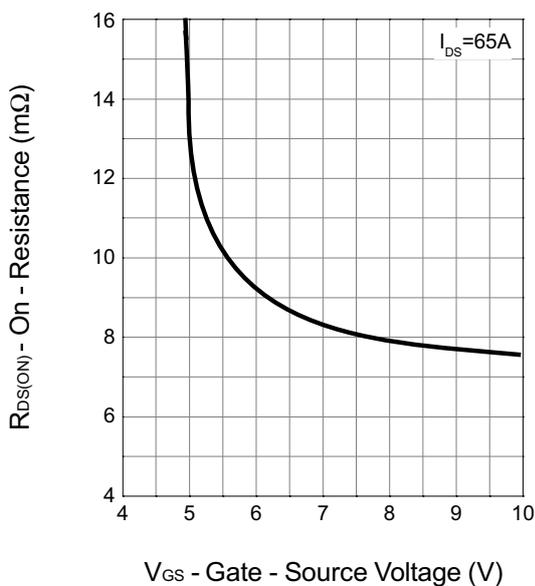
Output Characteristics



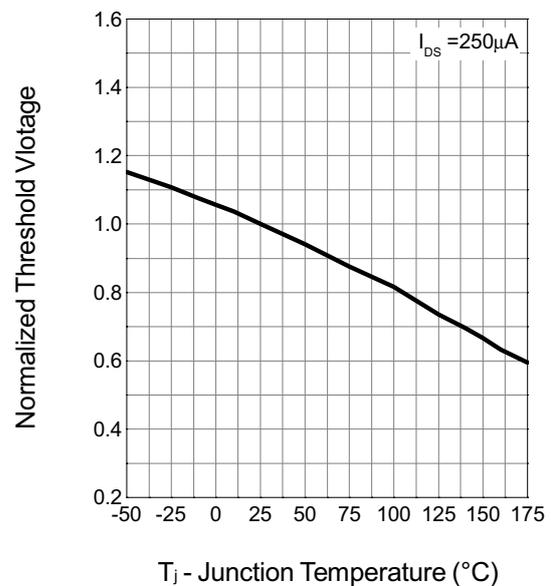
Drain-Source On Resistance



Drain-Source On Resistance

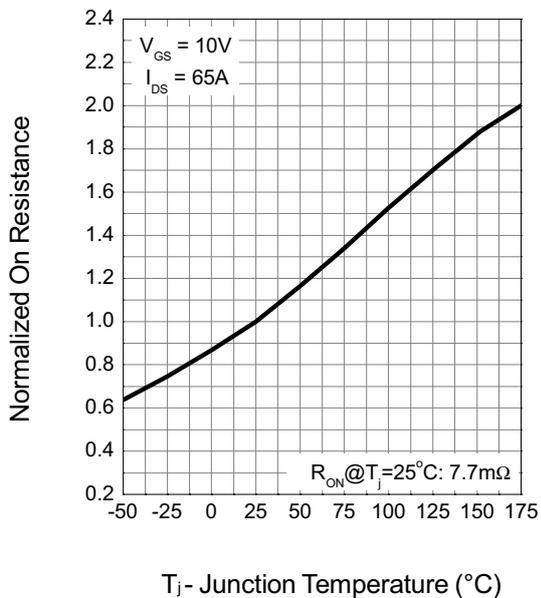


Gate Threshold Voltage

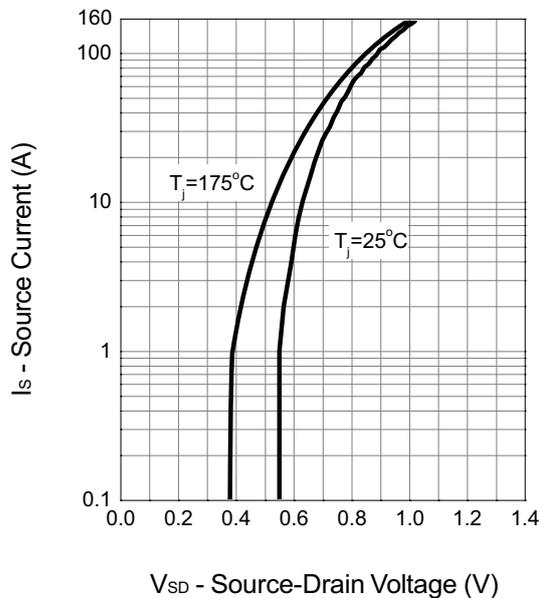


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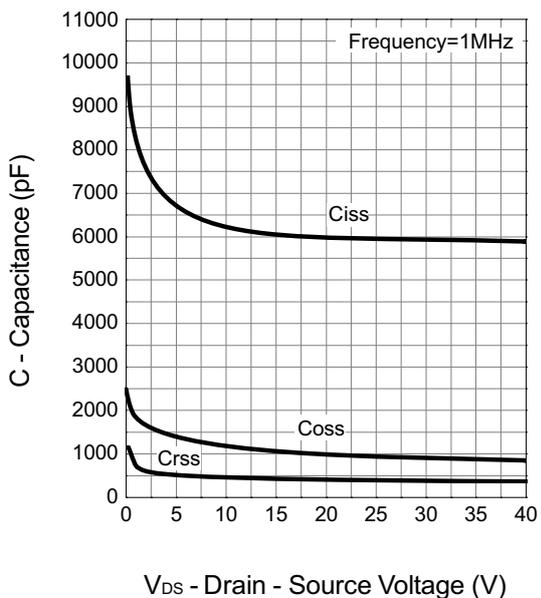
Drain-Source On Resistance



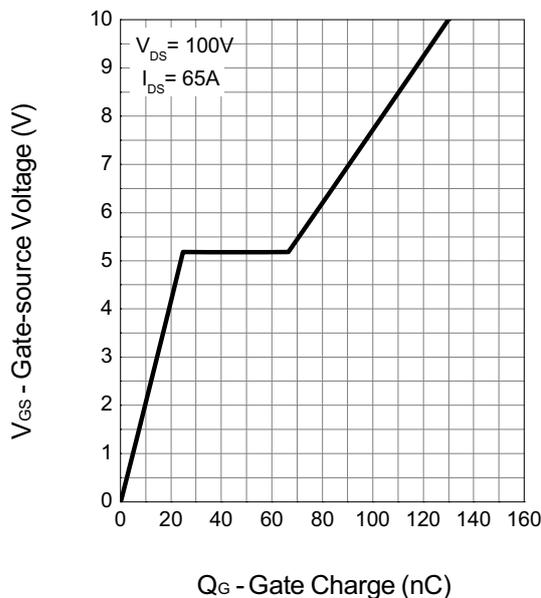
Source-Drain Diode Forward



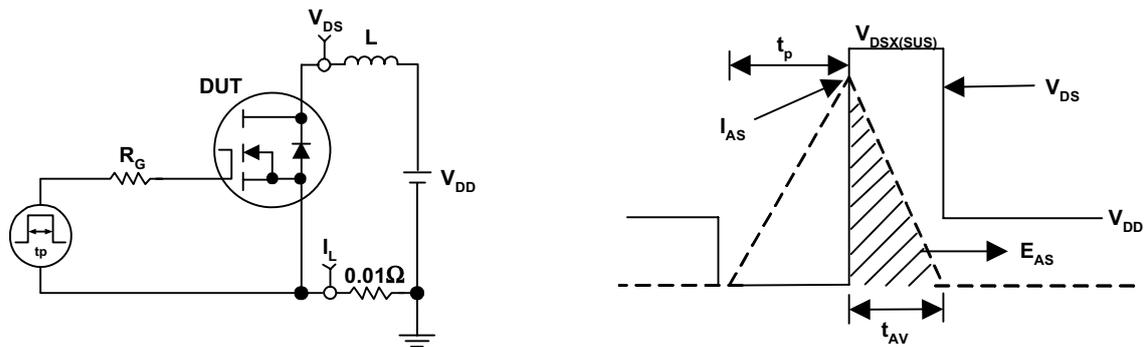
Capacitance



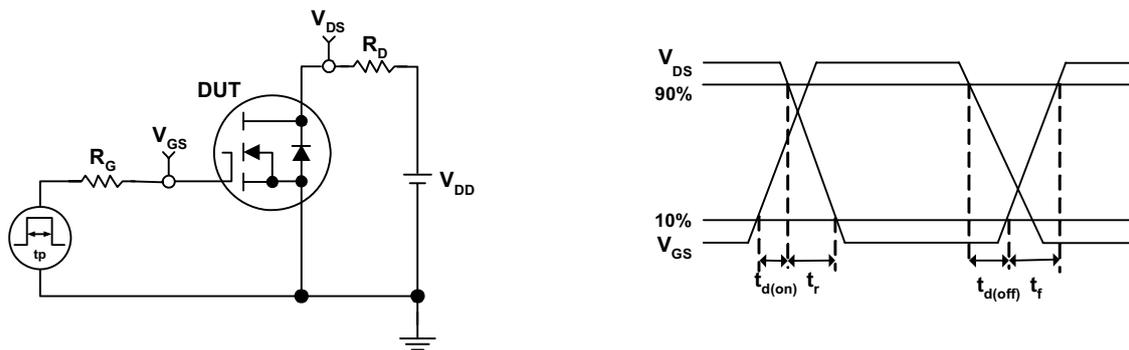
Gate Charge



Avalanche Test Circuit and Waveforms

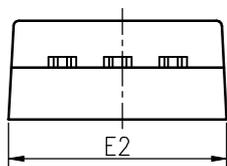
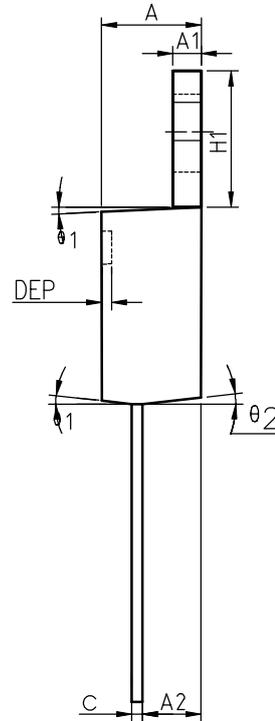
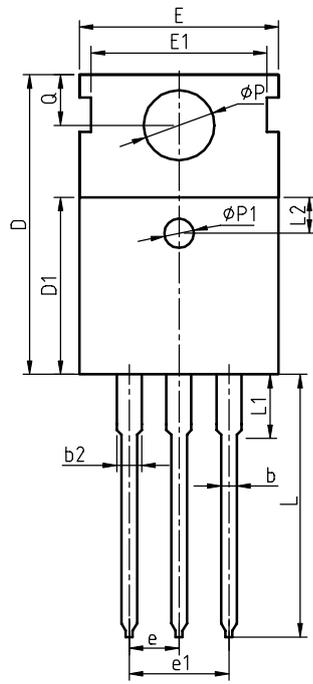


Avalanche Test Circuit and Waveforms



Package Information

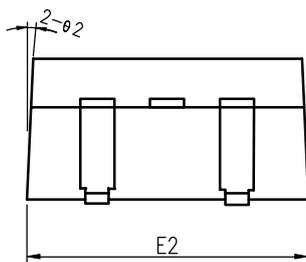
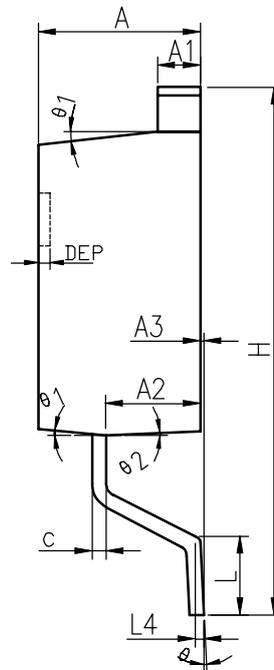
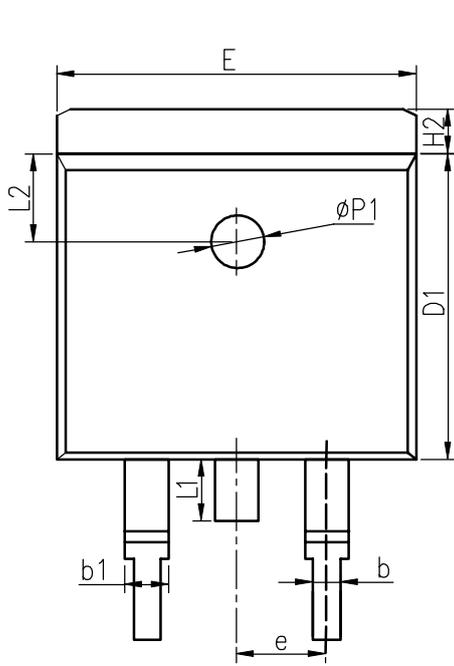
TO-220FB-3L



COMMON DIMENSIONS

SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.27	1.30	1.33	0.050	0.051	0.052
A2	2.35	2.40	2.50	0.093	0.094	0.098
b	0.77	0.80	0.90	0.030	0.031	0.035
b2	1.17	1.27	1.36	0.046	0.050	0.054
c	0.48	0.50	0.56	0.019	0.020	0.022
D	15.40	15.60	15.80	0.606	0.614	0.622
D1	9.00	9.10	9.20	0.354	0.358	0.362
DEP	0.05	0.10	0.20	0.002	0.004	0.008
E	9.80	10.00	10.20	0.386	0.394	0.402
E1	-	8.70	-	-	0.343	-
E2	9.80	10.00	10.20	0.386	0.394	0.402
e		2.54	BSC		0.100	BSC
e1		5.08	BSC		0.200	BSC
H1	6.40	6.50	6.60	0.252	0.256	0.260
L	12.75	13.50	13.65	0.502	0.531	0.537
L1	-	3.10	3.30	-	0.122	0.130
L2		2.50	REF		0.098	REF
P	3.50	3.60	3.63	0.138	0.142	0.143
P1	3.50	3.60	3.63	0.138	0.142	0.143
Q	2.73	2.80	2.87	0.107	0.110	0.113
$\theta 1$	5°	7°	9°	5°	7°	9°
$\theta 2$	1°	3°	5°	1°	3°	5°
$\theta 3$	1°	3°	5°	1°	3°	5°

TO-263-2L



COMMON DIMENSIONS

SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.22	1.27	1.32	0.048	0.050	0.052
A2	2.59	2.69	2.79	0.102	0.106	0.110
A3	0.00	0.10	0.20	0.000	0.004	0.008
b	0.77	0.813	0.90	0.030	0.032	0.035
b1	1.20	1.270	1.36	0.047	0.050	0.054
c	0.34	0.381	0.47	0.013	0.015	0.019
D1	8.60	8.70	8.80	0.339	0.343	0.346
E	10.00	10.16	10.26	0.394	0.400	0.404
E2	10.00	10.10	10.20	0.394	0.398	0.402
e	2.54 BSC			0.100 BSC		
H	14.70	15.10	15.50	0.579	0.594	0.610
H2	1.17	1.27	1.40	0.046	0.050	0.055
L	2.00	2.30	2.60	0.079	0.091	0.102
L1	1.45	1.55	1.70	0.057	0.061	0.067
L2	2.50 REF			0.098 REF		
L4	0.25 BSC			0.010 BSC		
	0°	5°	8°	0°	5°	8°
1	5°	7°	9°	5°	7°	9°
2	1°	3°	5°	1°	3°	5°
$\phi P1$	1.40	1.50	1.60	0.055	0.059	0.063
DEP	0.05	0.10	0.20	0.002	0.004	0.008

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