MT3115

N-Channel 150V/120A Power MOSFET

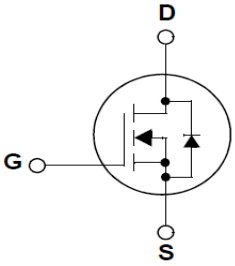
MT Semiconductor®

http://www.mtsemi.com

Features

- Typ R_{DS}(on)= 12mΩ / V_{GS}=10V,I_D=60A
- Fast Switching Speed
- Low Gate Charge
- 100% avalanche tested

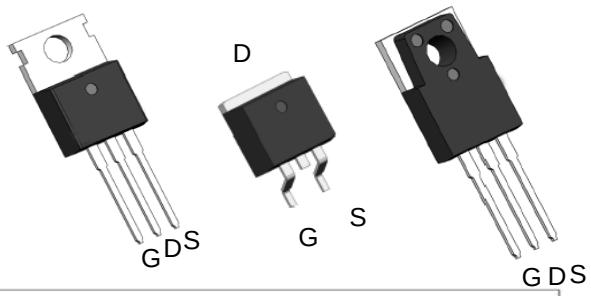
Simplified Schematic



General Description

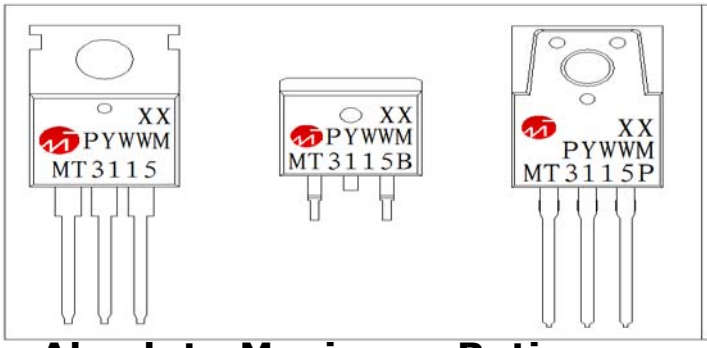
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low R_{DS}(ON) and fast switching speed.

MARKING DIAGRAM & PIN ASSIGNMENT



Applications

- Switching application
- DC-DC Synchronous rectification
- Power Managemement for Inverter Systems



Package Code

MT3115: TO-220FB-3L
MT3115B: TO-263-2L
MT3115P: TO-3P-3L

Date Code Lot No
PYWWM XX

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		150	V
V_{GSS}	Gate-Source Voltage		±25	
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current	T_C=25°C	120	A

Mounted on Large Heat Sink

I_{DM}	Pulsed Drain Current *	T_C=25°C	480**	A
I_D	Continuous Drain Current	T_C=25°C	120	A
		T_C=100°C	84	
P_D	Maximum Power Dissipation	T_C=25°C	300	W
		T_C=100°C	150	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		0.5	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	
Avalanche Ratings				
E_{AS}	Avalanche Energy, Single Pulsed	L=0.5mH	1025***	mJ

Note * Repetitive rating ; pulse width limiited by junction temperature
** Drain current is limited by junction temperature
*** VD=100V

Electrical Characteristics (T_C = 25°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	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=150V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	10	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	3.0	4.0	5.0	V
I_{GSS}	Gate Leakage Current	V_{GS}=±25V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$*	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=60A	-	12	15	mΩ
Diode Characteristics						
V_{SD}*	Diode Forward Voltage	I_{SD}=60A, V_{GS}=0V	-	0.8	1	V
t_{rr}	Reverse Recovery Time	I_{SD}=60A, dI_{SD}/dt=100A/μs	-	46	-	ns
Q_{rr}	Reverse Recovery Charge		-	98	-	nC

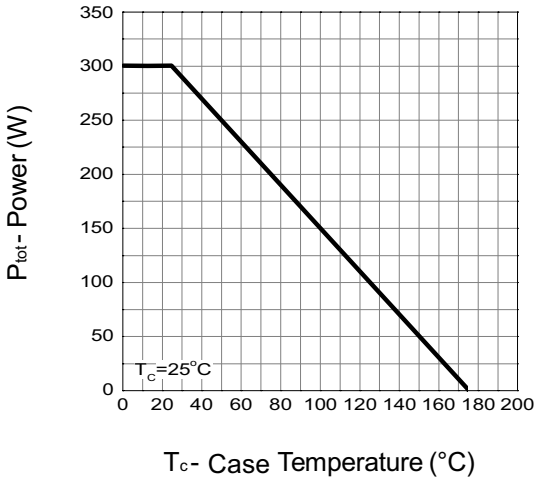
Electrical Characteristics (Cont.) (T_C = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	3.2	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, Frequency=1.0MHz	-	5785	-	pF
C_{oss}	Output Capacitance		-	548	-	
C_{rss}	Reverse Transfer Capacitance		-	321	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=75V, R_G= 3 Ω, I_{DS} =60A, V_{GS}=10V,	-	26	-	ns
T_r	Turn-on Rise Time		-	39	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	77	-	
T_f	Turn-off Fall Time		-	58	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=120 V, V_{GS}=10V, I_{DS}=60A	-	137	-	nC
Q_{gs}	Gate-Source Charge		-	28	-	
Q_{gd}	Gate-Drain Charge		-	46	-	

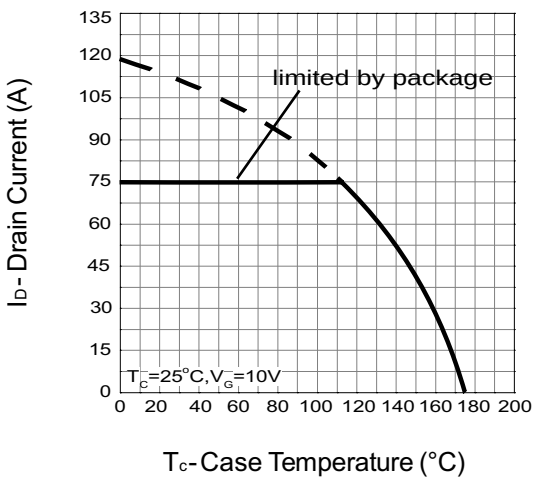
Note * : Pulse test ; pulse width ≤300μs, duty cycle≤2%.

Typical Operating Characteristics

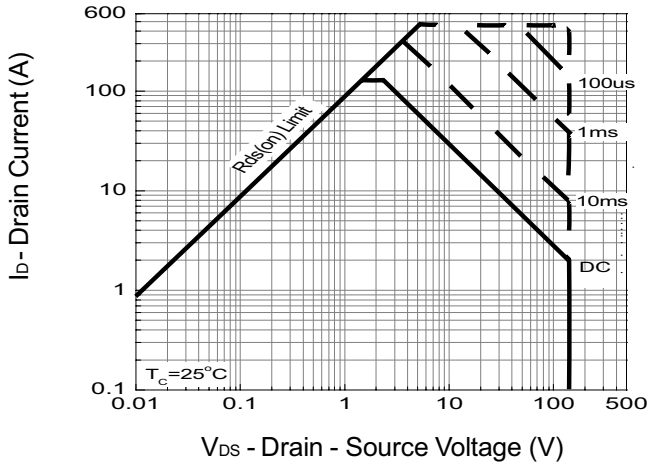
Power Dissipation



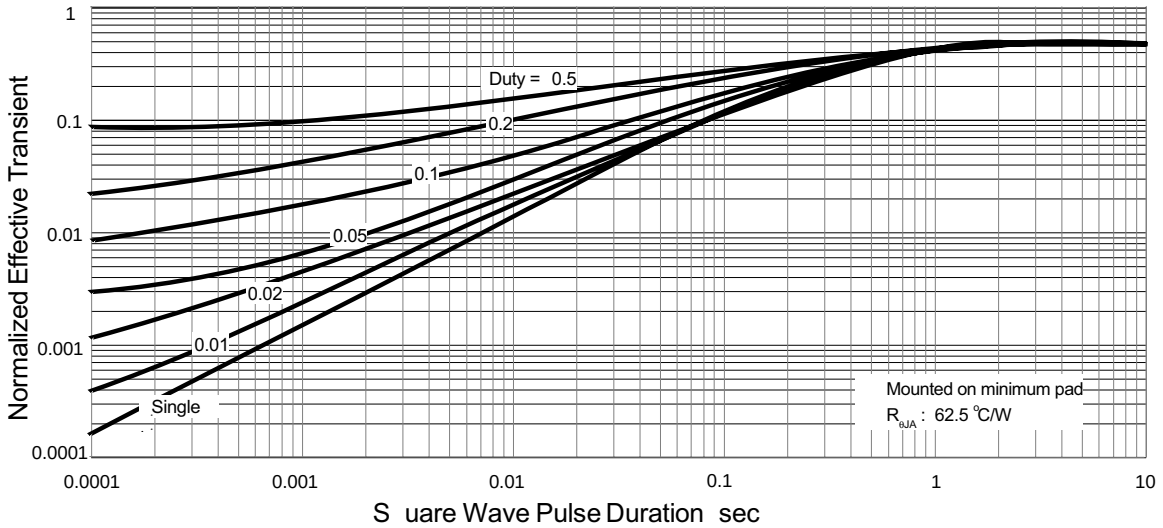
Drain Current



Safe Operation Area

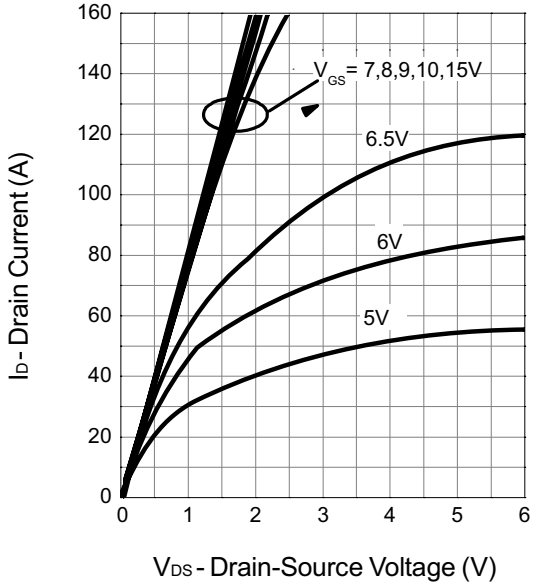


Thermal Transient Impedance

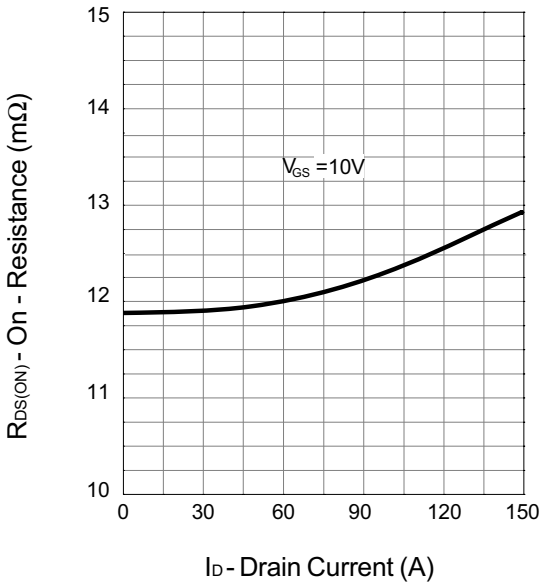


Typical Operating Characteristics (Cont.)

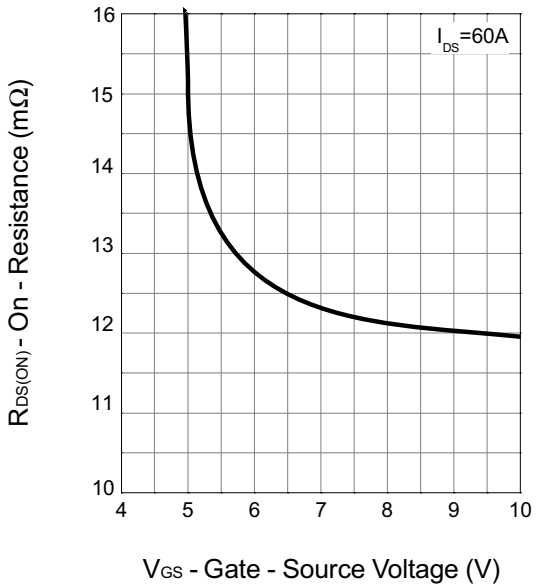
Output Characteristics



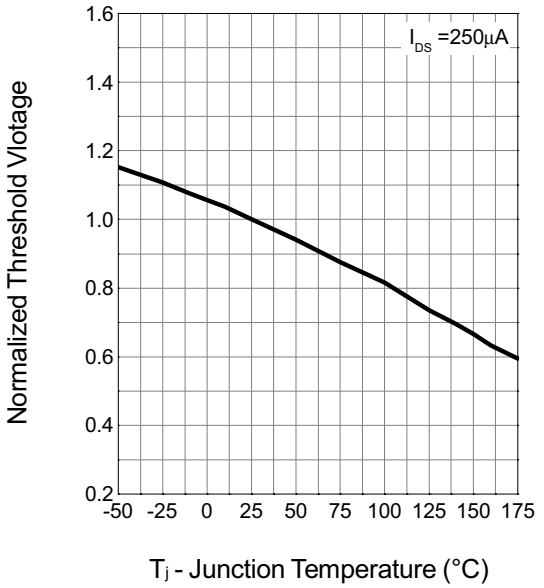
Drain-Source On Resistance



Drain-Source On Resistance

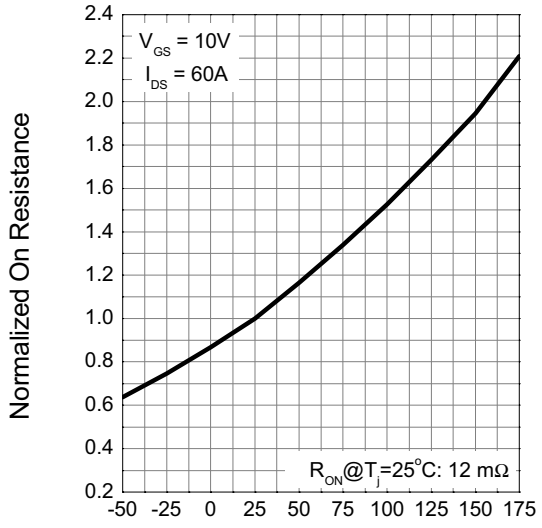


Gate Threshold Voltage

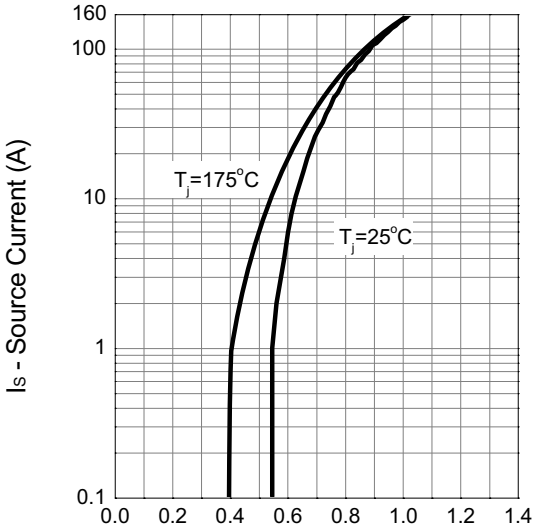


Typical Operating Characteristics (Cont.)

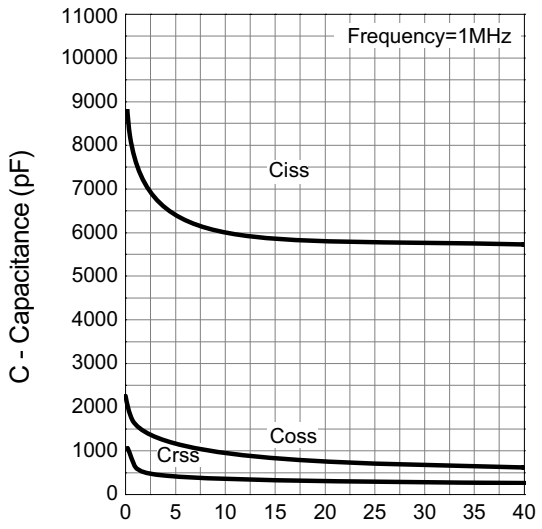
Drain-Source On Resistance



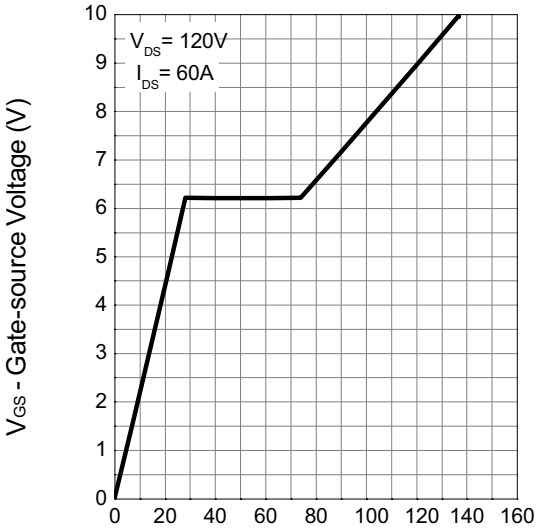
Source-Drain Diode Forward



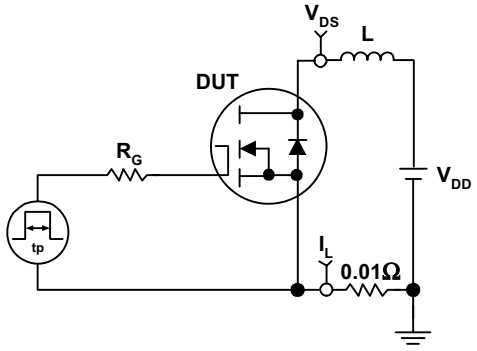
Capacitance

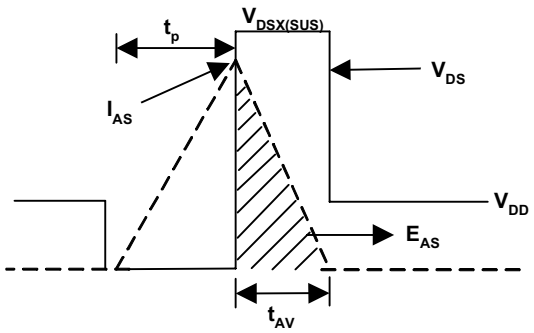


Gate Charge

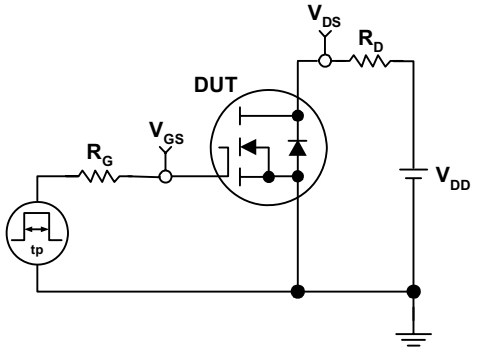


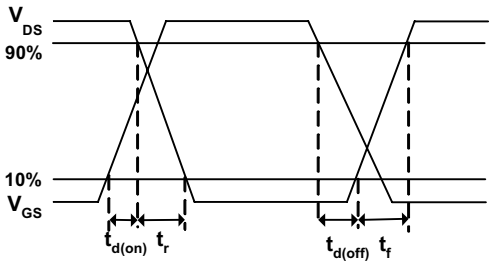
Avalanche Test Circuit and Waveforms





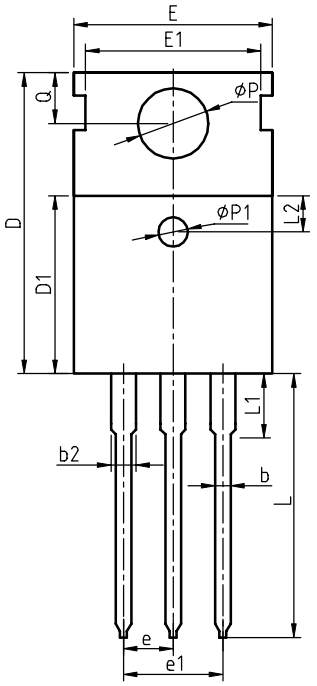
Avalanche Test Circuit and Waveforms

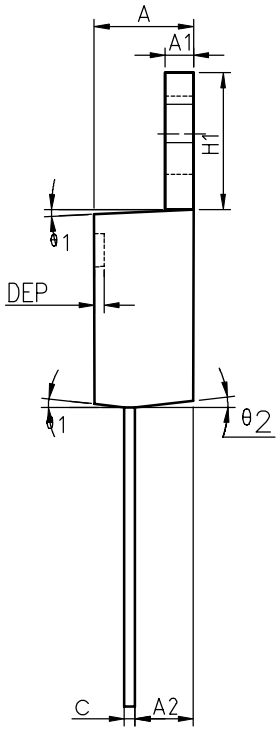


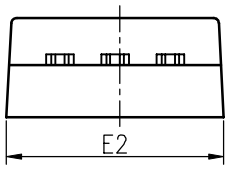


Package Information

TO-220FB-3L



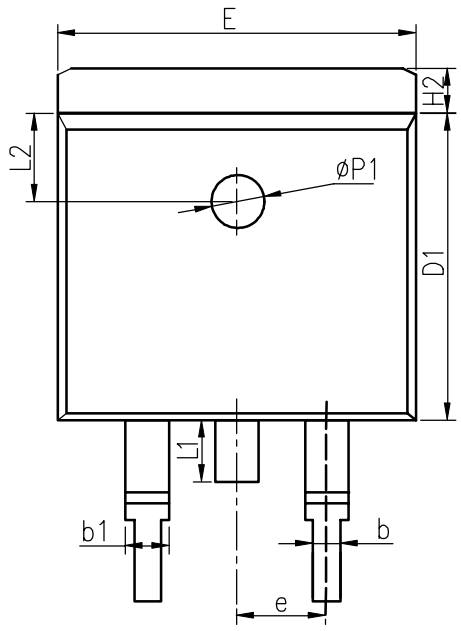


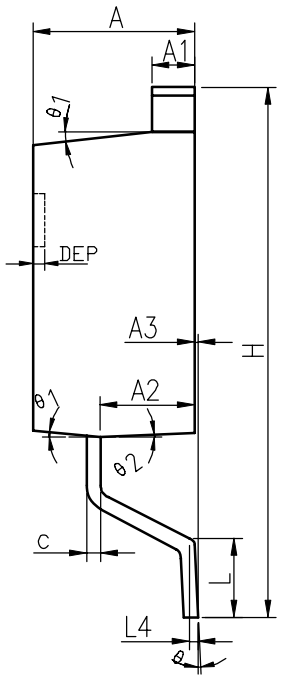


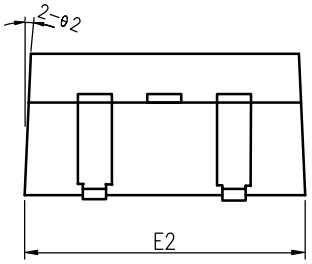
COMMON DIMENSIONS

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
θ1	5°	7°	9°	5°	7°	9°
θ2	1°	3°	5°	1°	3°	5°
θ3	1°	3°	5°	1°	3°	5°

TO-263-2L



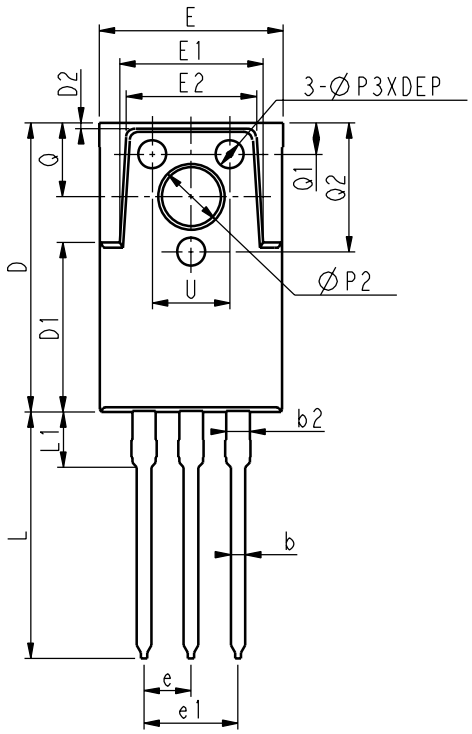


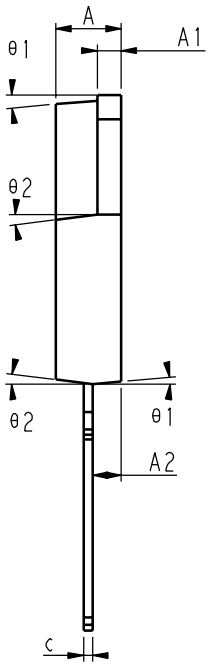


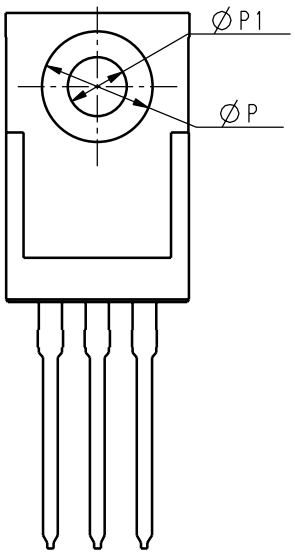
COMMON DIMENSIONS

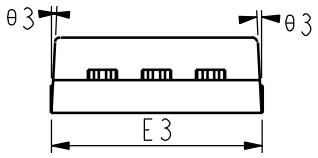
SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.22	1.27	1.32	0.048	0.050	0.052
A2	2.59	2.69	2.79	0.102	0.106	0.110
A3	0.00	0.10	0.20	0.000	0.004	0.008
b	0.77	0.813	0.90	0.030	0.032	0.035
b1	1.20	1.270	1.36	0.047	0.050	0.054
c	0.34	0.381	0.47	0.013	0.015	0.019
D1	8.60	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°
ΦP1	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

TO-3P-3L









COMMON DIMENSIONS

SYMBOL	MIN	NOM	MAX
A	3.36	3.56	3.76
A1	1.27	1.30	1.37
A2	1.49	1.54	1.64
b	0.77	0.80	0.90
b2	1.17	1.27	1.36
c	0.48	0.50	0.56
D	15.50	15.70	15.90
D1	9.10	9.20	9.30
D2		0.30	REF
DEP	0.05	0.10	0.20
E	9.88	10.00	10.20
E1	7.80	8.00	8.20
E2	6.90	7.10	7.30
E3	9.90	10.00	10.10
e		2.54	BSC
e1		5.08	BSC
L	13.25	13.40	13.55
L1	–	3.00	3.30
P		6.00	REF
P1		3.20	REF
P2		3.57	REF
P3	1.40	1.50	1.60
Q	3.93	4.00	4.07
Q1	1.60	1.70	1.80
Q2	6.80	7.00	7.20
U	4.00	4.20	4.40
θ1	3°	5°	7°
θ2	5°	7°	9°
θ3	1°	3°	5°

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   1）生命维持装置。
   2）植埋于人体使用的装置。
   3）用于治疗（切除患部、给药等）的装置。
   4）其他直接影响到人的生命的装置。
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Keep safety first in your circuit designs!

1. MOS-TECH Semiconductor Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.