

# MT3240A/B

## N-Channel Low Qg<sup>®</sup> MOSFET

40V, 250A, 2.3mΩ

### Features

- Max R<sub>DS(on)</sub> = 2.3mΩ at V<sub>GS</sub> = 10V, I<sub>D</sub> = 40A
- High performance trench technology for extremely low R<sub>DS(on)</sub>
- Low Gate Charge
- High power and current handling capability

### 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<sub>DS(ON)</sub> and fast switching speed.

### Applications

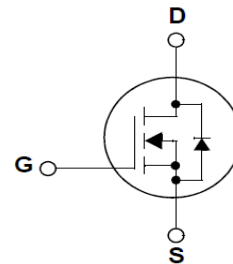
- DC-DC primary bridge
- DC-DC Synchronous rectification
- Power Management for Inverter Systems



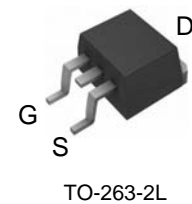
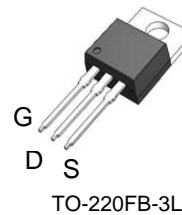
**MT Semiconductor<sup>®</sup>**

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### Simplified Schematic



### MARKING DIAGRAM & PIN ASSIGNMENT



		<b>Package Code</b> MT3240A: T0-220FB-3L MT3240AB: T0-263-2L	
		<b>Date Code</b> PYWWM	<b>Lot No</b> XX

## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> (T <sub>C</sub> = 25°C Unless Otherwise Noted)			
V <sub>DSS</sub>	Drain-Source Voltage	40	V
V <sub>GSS</sub>	Gate-Source Voltage	±20	
T <sub>J</sub>	Maximum Junction Temperature	175	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 175	°C
I <sub>S</sub>	Diode Continuous Forward Current	T <sub>C</sub> = 25°C 250	A

## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_C=25^\circ\text{C}$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	40	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	
$T_J$	Maximum Junction Temperature	175	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ 250	A
<b>Mounted on Large Heat Sink</b>			
$I_{DM}$	Pulsed Drain Current *	$T_C=25^\circ\text{C}$ 805**	A
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$ 250	A
		$T_C=100^\circ\text{C}$ 162	
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 288	W
		$T_C=100^\circ\text{C}$ 144	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.52	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	
<b>Avalanche Ratings</b>			
$E_{AS}$	Avalanche Energy, Single Pulsed	$L=0.5\text{mH}$ 1.8***	J

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

\*\* Drain current is limited by junction temperature

\*\*\*  $V_D=32\text{V}$

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

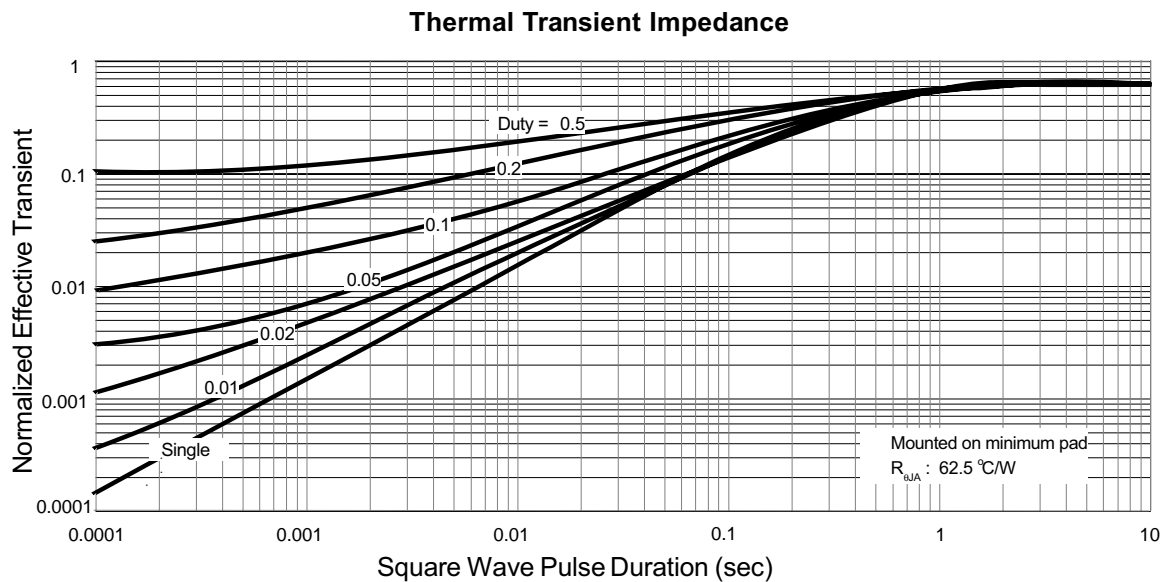
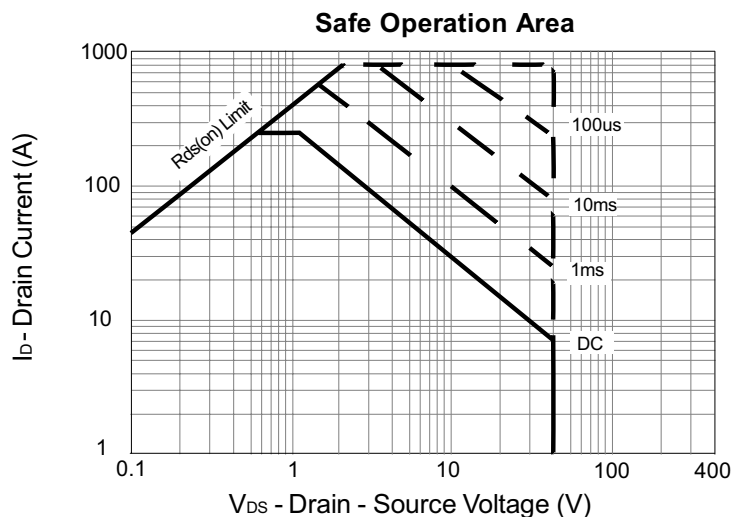
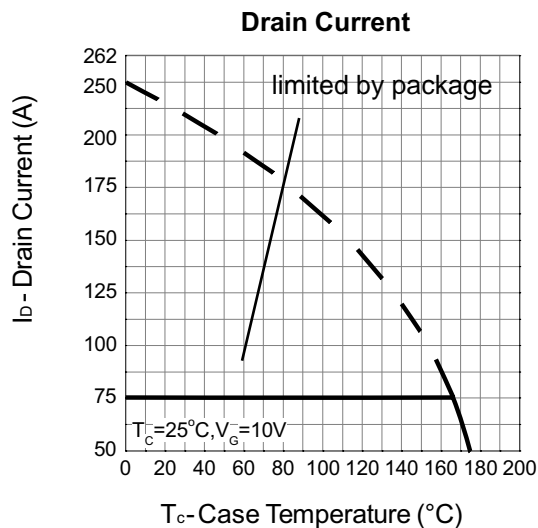
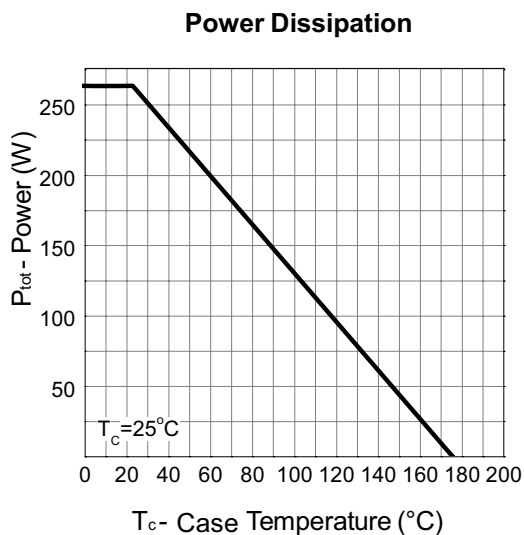
Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_{DS}=250\mu\text{A}$	40	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=40\text{V}, V_{GS}=0\text{V}$ $T_J=85^\circ\text{C}$	-	-	1	$\mu\text{A}$
			-	-	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	$V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$	-	-	$\pm 100$	nA
$R_{DS(ON)*}$	Drain-Source On-state Resistance	$V_{GS}=10\text{V}, I_{DS}=125\text{A}$	-	2.3	3.0	$\text{m}\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^*$	Diode Forward Voltage	$I_{SD}=125\text{A}, V_{GS}=0\text{V}$	-	0.8	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=125\text{A},$ $dI_{SD}/dt=100\text{A}/\mu\text{s}$	-	38	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	62	-	nC

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

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
<b>Dynamic Characteristics</b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.0	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	6985	-	pF
$C_{oss}$	Output Capacitance		-	1863	-	
$C_{rss}$	Reverse Transfer Capacitance		-	682	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, R_G=6\ \Omega,$ $I_{DS}=125A, V_{GS}=10V,$	-	35	-	ns
$T_r$	Turn-on Rise Time		-	20	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	45	-	
$T_f$	Turn-off Fall Time		-	62	-	
<b>Gate Charge Characteristics</b>						
$Q_g$	Total Gate Charge	$V_{DS}=32V, V_{GS}=10V,$ $I_{DS}=125A$	-	195	-	nC
$Q_{gs}$	Gate-Source Charge		-	30	-	
$Q_{gd}$	Gate-Drain Charge		-	80	-	

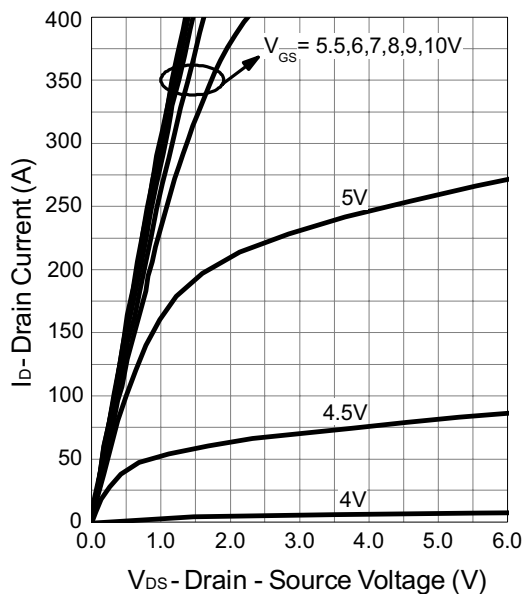
Note \* : Pulse test ; pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .

## Typical Operating Characteristics

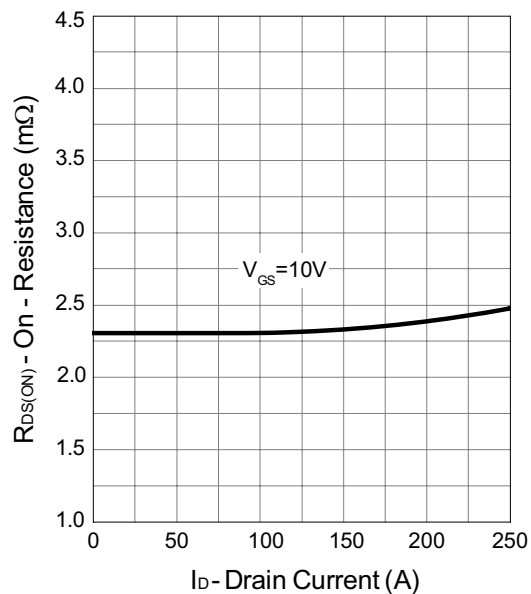


## Typical Operating Characteristics (Cont.)

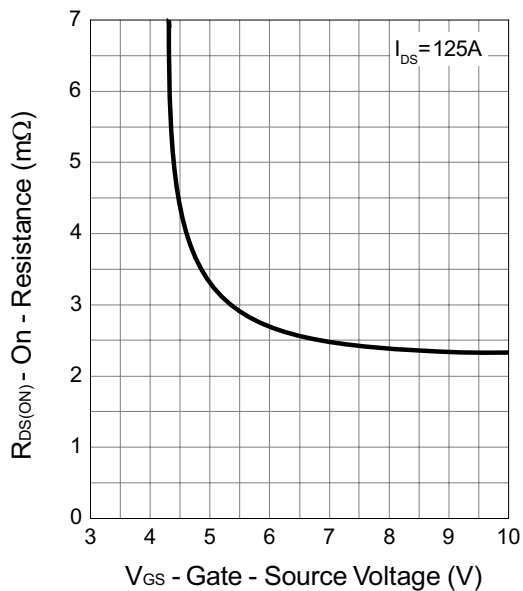
Output Characteristics



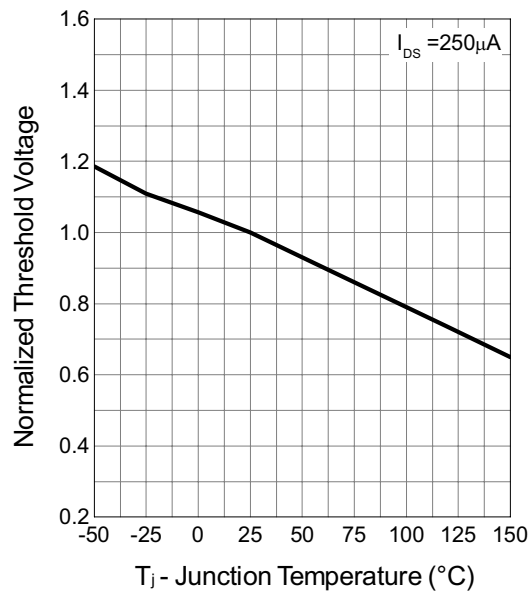
Drain-Source On Resistance



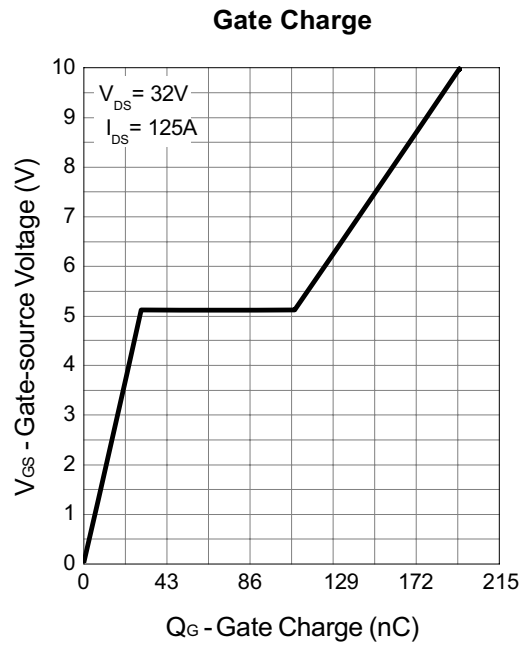
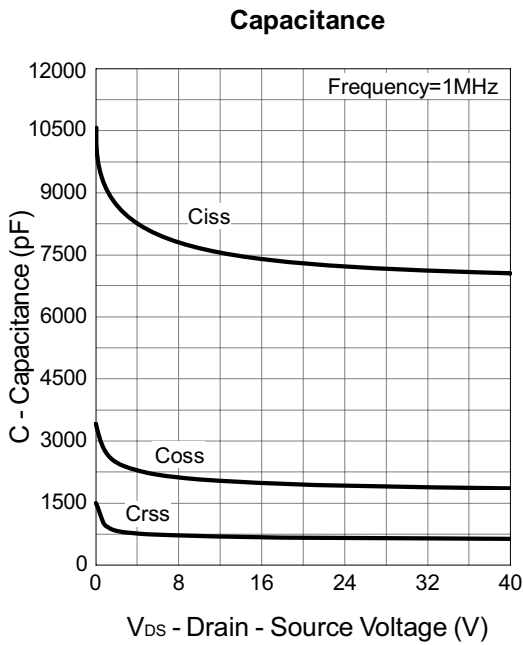
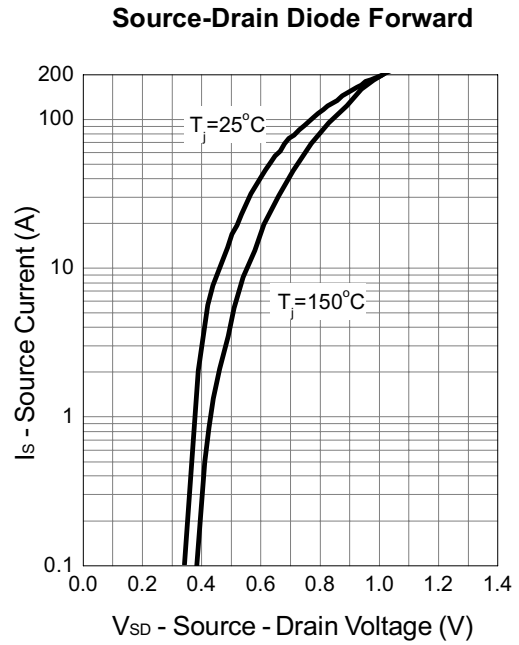
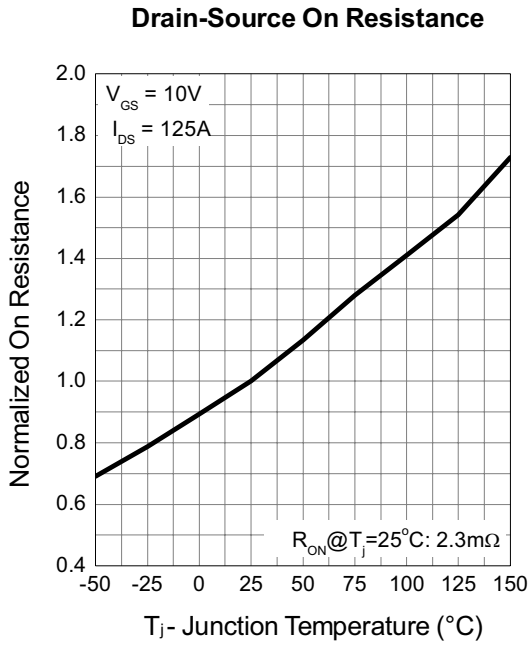
Gate-Source On Resistance



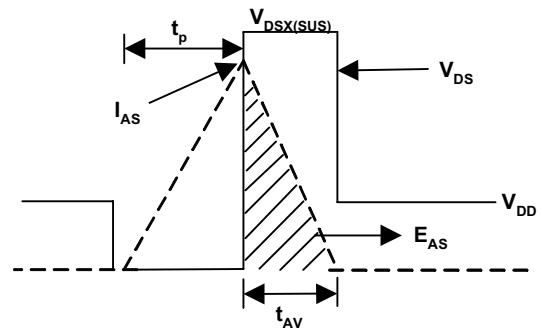
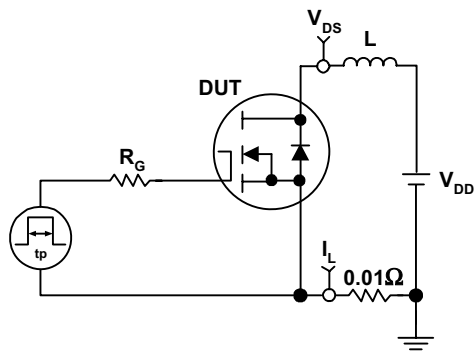
Gate Threshold Voltage



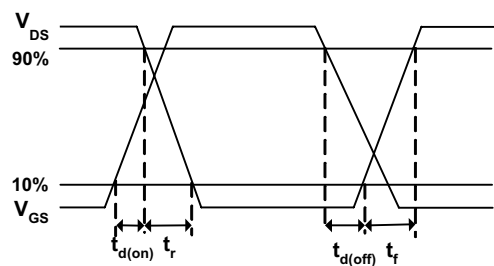
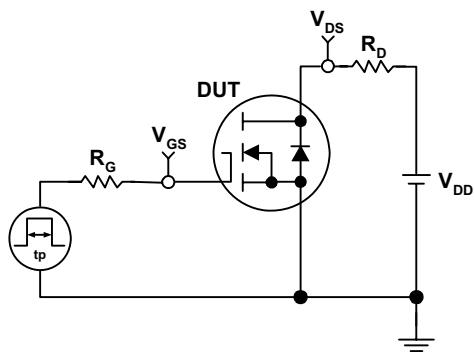
## Typical Operating Characteristics (Cont.)



## Avalanche Test Circuit and Waveforms

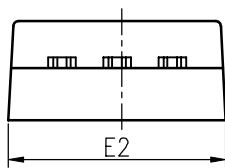
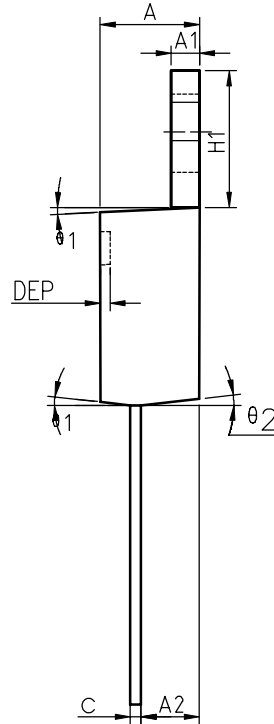
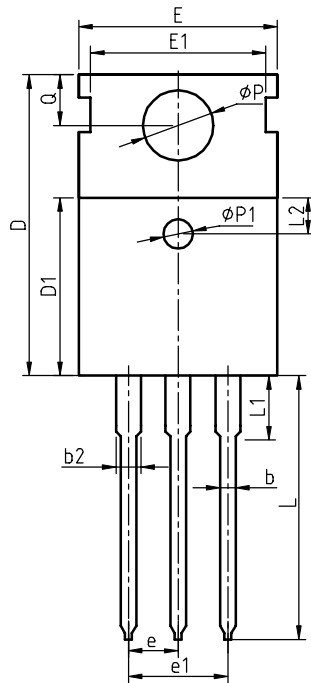


## Avalanche Test Circuit and Waveforms



# Package Information

## TO-220FB-3L

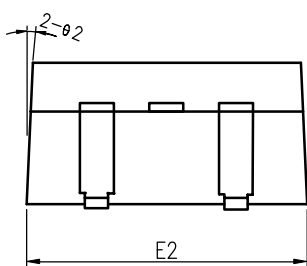
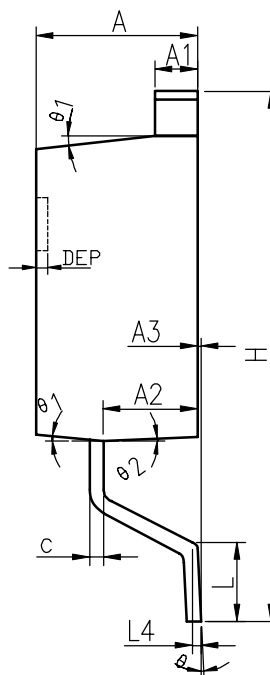
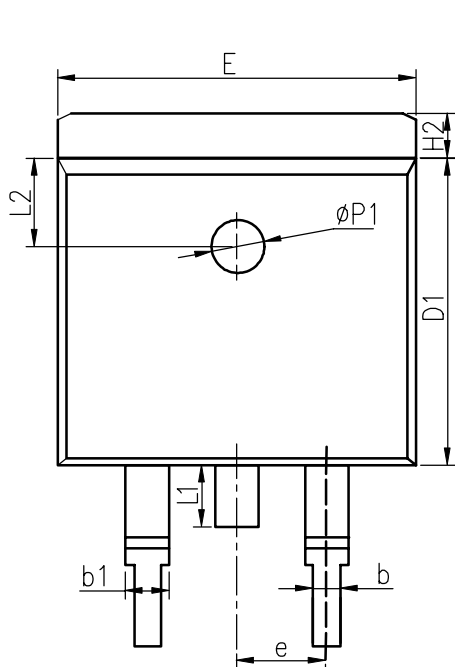


COMMON DIMENSIONS

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
θ 1	5°	7°	9°	5°	7°	9°
θ 2	1°	3°	5°	1°	3°	5°
θ 3	1°	3°	5°	1°	3°	5°



TO-263-2L



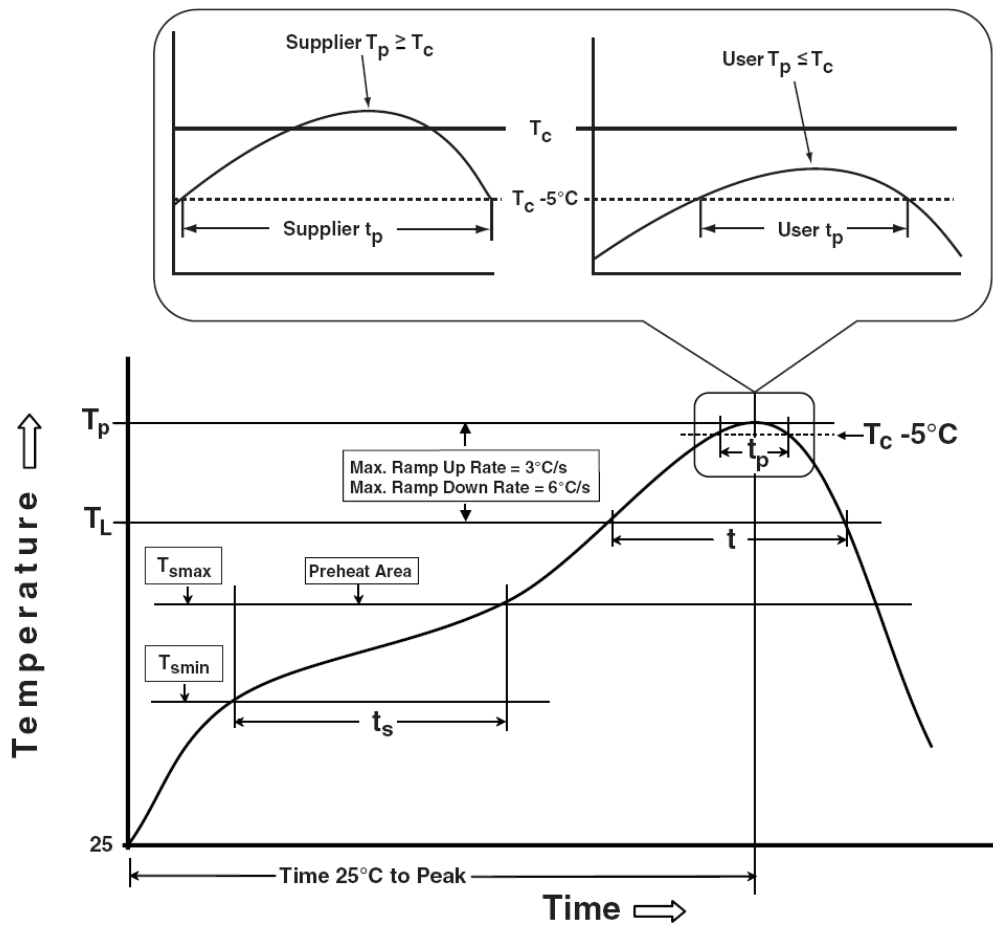
COMMON DIMENSIONS

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

## Devices Per Unit

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

## Classification Profile



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10. 本公司一直致力于提高产品的质量和可靠性, 但一般来说, 半导体产品总会以一定的概率发生故障、或者由于使用条件不同而出现错误运行等。为了避免因本公司的产品发生故障或者错误运行而导致人身事故和火灾或造成社会性的损失, 希望客户能自行负责进行冗余设计、采取延烧对策及进行防止错误运行等的安全设计(包括硬件和软件两方面的设计)以及老化处理等, 这是作为机器和系统的出厂保证。特别是单片机的软件, 由于单独进行验证很困难, 所以要求在顾客制造的最终的机器及系统上进行安全检验工作。
11. 如果把本资料所记载的产品从其载体设备上卸下, 有可能造成婴儿误吞的危险。顾客在将本公司产品安装到顾客的设备上时, 请顾客自行负责将本公司产品设置为不容易剥落的安全设计。如果从顾客的设备上剥落而造成事故时, 本公司将不承担任何责任。
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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.