

# MDP7N60B / MDF7N60B

## N-Channel MOSFET 600V, 7.0A, 1.15Ω

### General Description

These N-channel MOSFET are produced using advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

These devices are suitable device for SMPS, high Speed switching and general purpose applications.

### Features

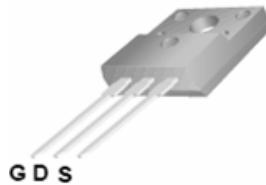
- $V_{DS} = 600V$
- $V_{DS} = 660V$  @  $T_{jmax}$
- $I_D = 7.0A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} \leq 1.15\Omega$  @  $V_{GS} = 10V$

### Applications

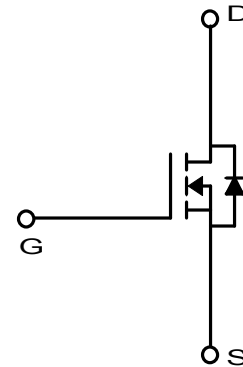
- Power Supply
- PFC
- High Current, High Speed Switching



TO-220  
MDP Series



TO-220F  
MDF Series



### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics		Symbol	MDP7N60B	MDF7N60B	Unit
Drain-Source Voltage		$V_{DSS}$	600		V
Drain-Source Voltage @ $T_{jmax}$		$V_{DSS} @ T_{jmax}$	660		V
Gate-Source Voltage		$V_{GSS}$	±30		V
Continuous Drain Current	$T_c=25^\circ C$	$I_D$	7.0	7.0*	A
	$T_c=100^\circ C$		4.4	4.4*	A
Pulsed Drain Current <sup>(1)</sup>		$I_{DM}$	28	28*	A
Power Dissipation	$T_c=25^\circ C$	$P_D$	131	42	W
	Derate above $25^\circ C$		1.05	0.33	W/ $^\circ C$
Repetitive Avalanche Energy <sup>(1)</sup>		$E_{AR}$	13.1		mJ
Peak Diode Recovery $dv/dt$ <sup>(3)</sup>		$dv/dt$	4.5		V/ns
Single Pulse Avalanche Energy <sup>(4)</sup>		$E_{AS}$	220		mJ
Junction and Storage Temperature Range		$T_J, T_{stg}$	-55~150		$^\circ C$

\*  $I_D$  limited by maximum junction temperature

### Thermal Characteristics

Characteristics	Symbol	MDP7N60B	MDF7N60B	Unit
Thermal Resistance, Junction-to-Ambient <sup>(1)</sup>	$R_{\theta JA}$	62.5	62.5	$^\circ C/W$
Thermal Resistance, Junction-to-Case <sup>(1)</sup>	$R_{\theta JC}$	0.95	3.01	

## Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDP7N60BTH	-55~150°C	TO-220	Tube	Halogen Free
MDF7N60BTH	-55~150°C	TO-220F	Tube	Halogen Free

## Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	600	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Drain Cut-Off Current	$I_{DSS}$	$V_{DS} = 600V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 3.5A$	-	1.0	1.15	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 30V, I_D = 3.5A$	-	7.5	-	S
<b>Dynamic Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 480V, I_D = 7.0A, V_{GS} = 10V^{(3)}$	-	20.1	-	nC
Gate-Source Charge	$Q_{gs}$		-	4.5	-	
Gate-Drain Charge	$Q_{gd}$		-	7.9	-	
Input Capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	800	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	5	-	
Output Capacitance	$C_{oss}$		-	90	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 300V, I_D = 7.0A, R_G = 25\Omega^{(3)}$	-	17	-	ns
Rise Time	$t_r$		-	27	-	
Turn-Off Delay Time	$t_{d(off)}$		-	64	-	
Fall Time	$t_f$		-	33	-	
<b>Drain-Source Body Diode Characteristics</b>						
Maximum Continuous Drain to Source Diode Forward Current	$I_S$		-	7	-	A
Source-Drain Diode Forward Voltage	$V_{SD}$	$I_S = 7.0A, V_{GS} = 0V$	-		1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 7.0A, di/dt = 100A/\mu s^{(3)}$	-	345	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	3.2	-	$\mu C$

Note :

- Pulse width is based on  $R_{\theta JC}$  &  $R_{\theta JA}$  and the maximum allowed junction temperature of 150°C.
- Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ , pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ C$ .
- $I_{SD} \leq 7.0A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$
- $L = 8.2mH$ ,  $I_{AS} = 7.0A$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$ ,

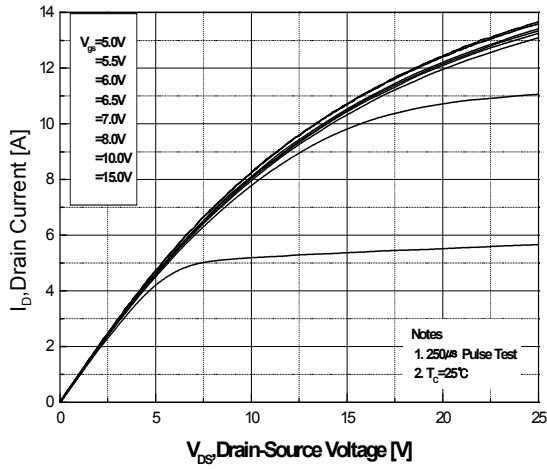


Fig.1 On-Region Characteristics

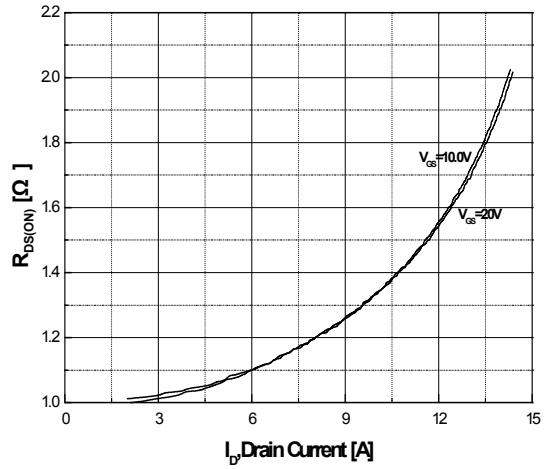


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

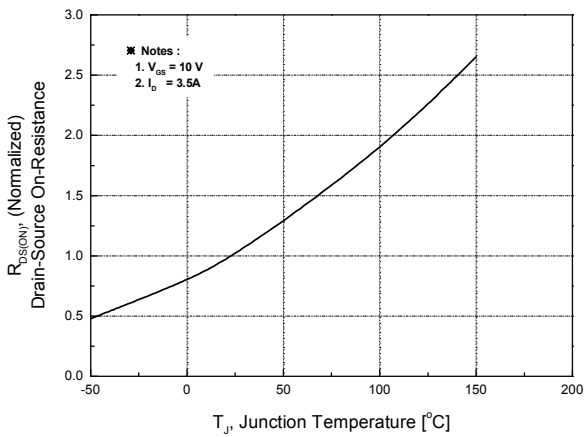


Fig.3 On-Resistance Variation with Temperature

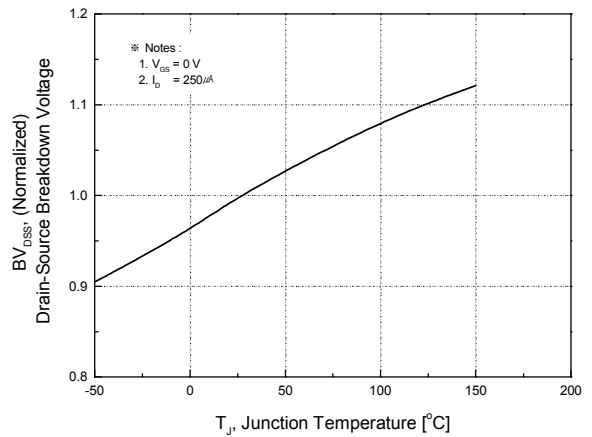


Fig.4 Breakdown Voltage Variation vs. Temperature

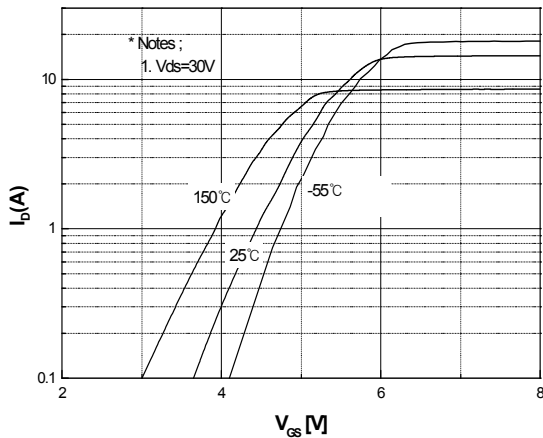


Fig.5 Transfer Characteristics

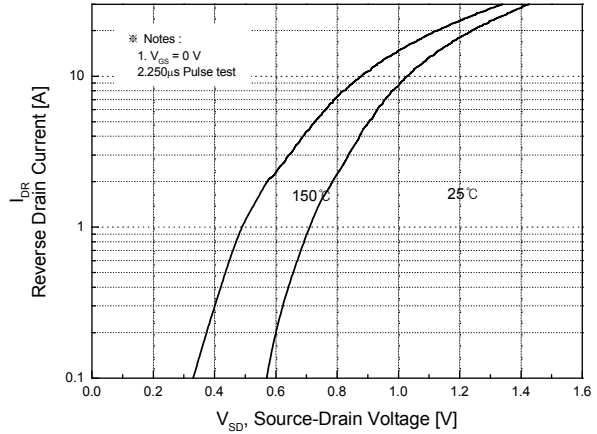


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

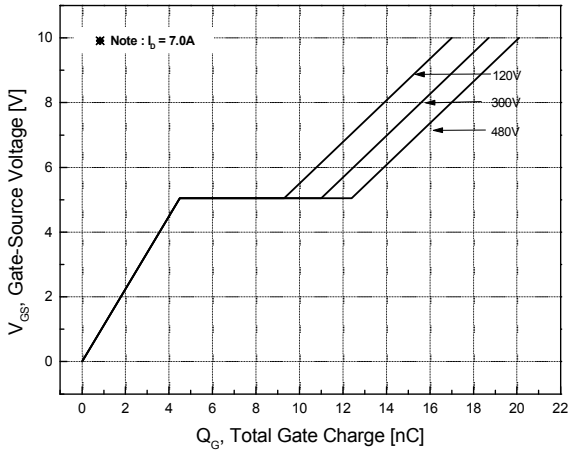


Fig.7 Gate Charge Characteristics

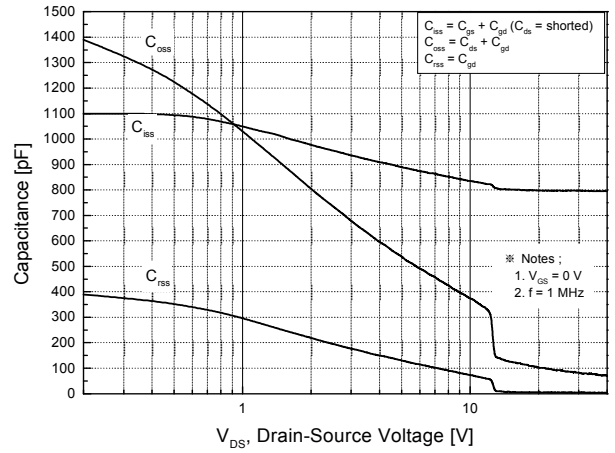


Fig.8 Capacitance Characteristics

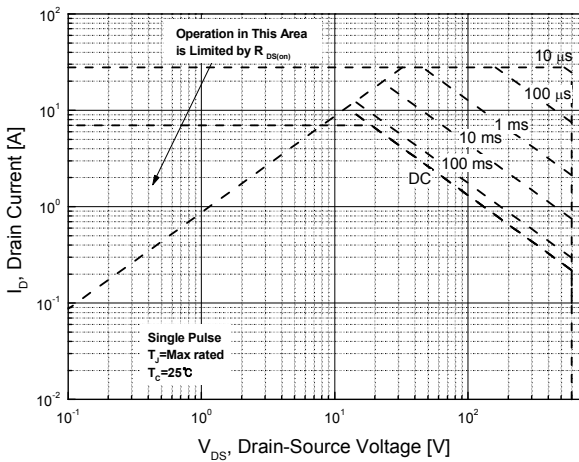


Fig.9 Maximum Safe Operating Area MDP7N60B(TO-220)

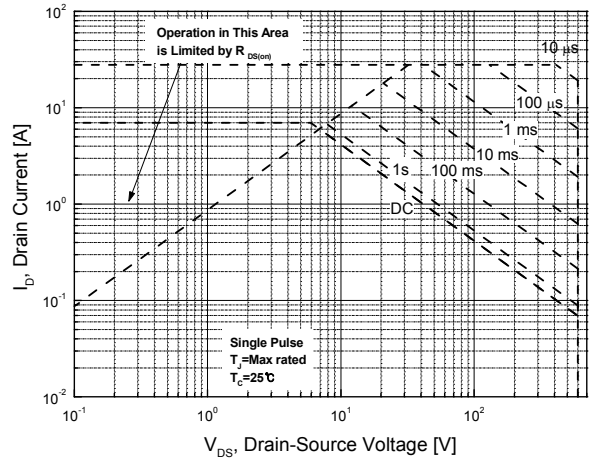


Fig.10 Maximum Safe Operating Area MDF7N60B(TO-220F)

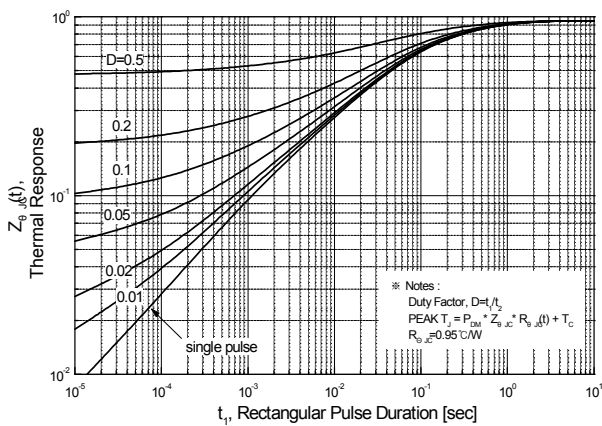


Fig.11 Transient Thermal Response Curve MDP7N60B(TO-220)

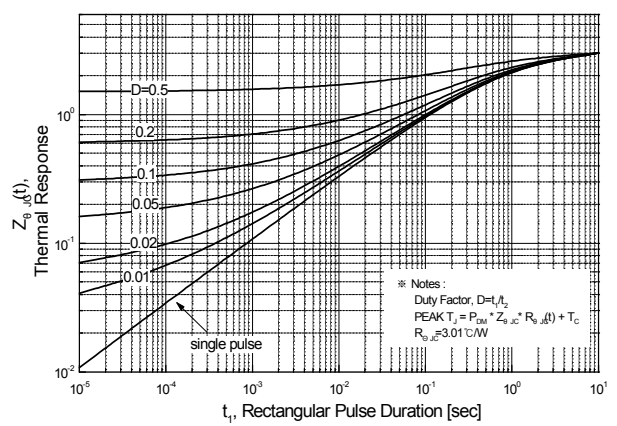
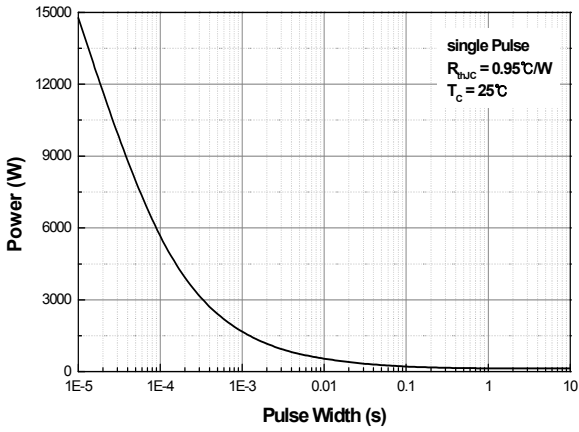
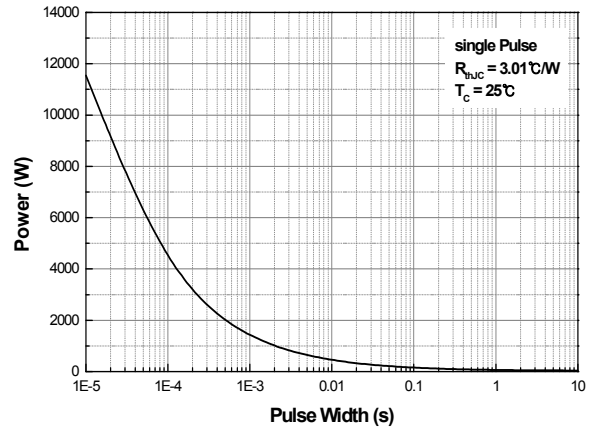


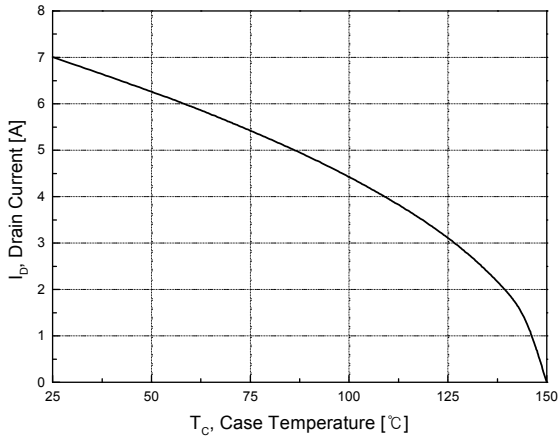
Fig.12 Transient Thermal Response Curve MDF7N60B(TO-220F)



**Fig.13 Single Pulse Maximum Power Dissipation MDP7N60B(TO-220)**



**Fig.14 Single Pulse Maximum Power Dissipation MDF7N60B(TO-220F)**

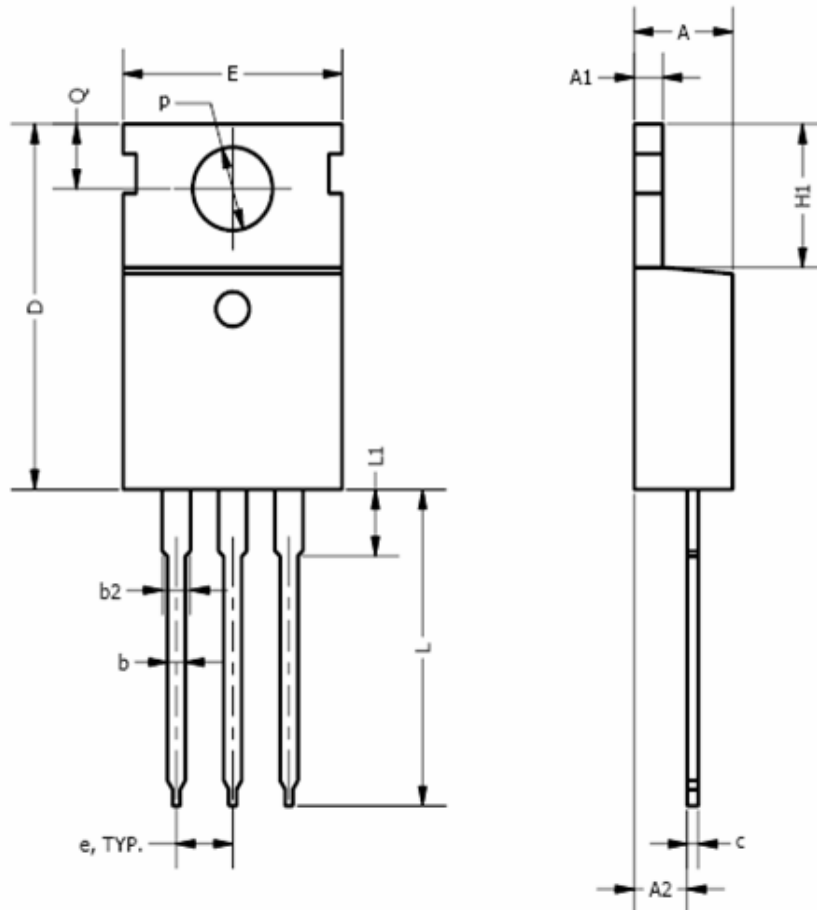


**Fig.15 Maximum Drain Current vs. Case Temperature**

**Physical Dimensions**

**3 Leads, TO-220**

Dimensions are in millimeters unless otherwise specified

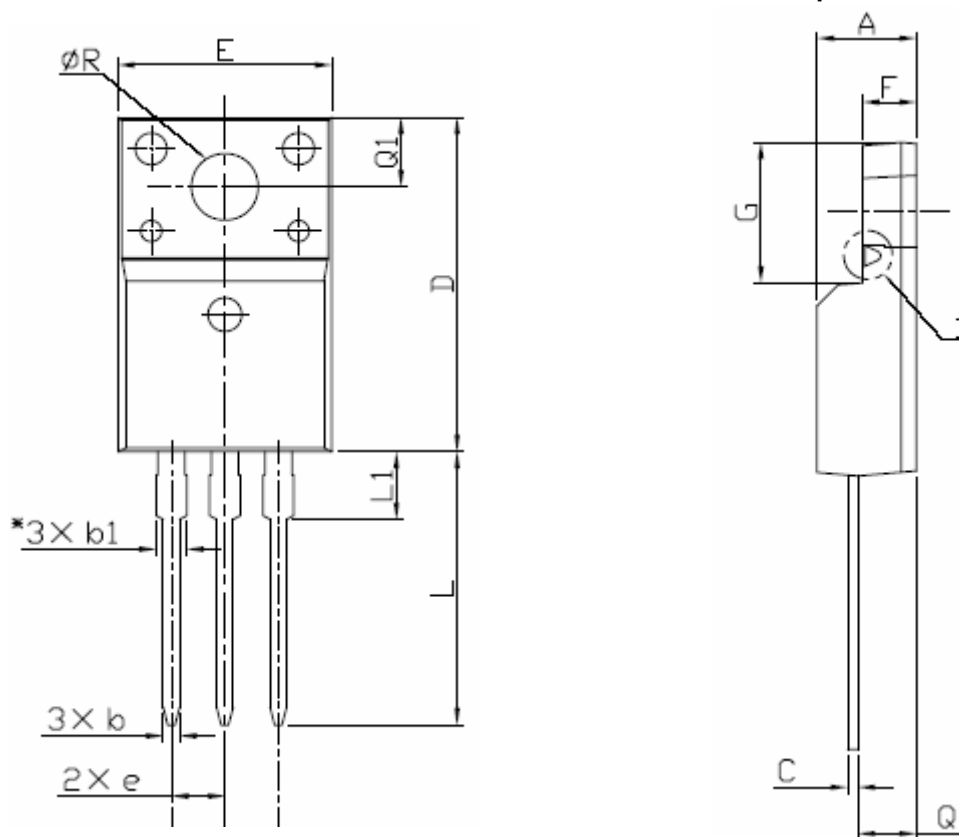


Symbol	Min	Nom	Max
A	3.56		4.83
A1	0.50		1.40
A2	2.03		2.92
b	0.38	0.69	1.02
b2	1.14	1.45	1.78
c	0.36		0.61
D	14.22		16.51
e	2.54 TYP		
E	9.65		10.67
H1	5.84		6.86
L	12.70		14.73
L1			6.35
$\phi P$	3.53		4.09
Q	2.54		3.43

## Physical Dimensions

## 3 Leads, TO-220F


Dimensions are in millimeters unless otherwise specified



Symbol	Min	Nom	Max
A	4.50		4.93
b	0.63		0.91
b1	1.15		1.47
C	0.33		0.63
D	15.47		16.13
E	9.60		10.71
e		2.54	
F	2.34		2.84
G	6.48		6.90
L	12.24		13.72
L1	2.79		3.67
Q	2.52		2.96
Q1	3.10		3.50
ØR	3.00		3.55

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