

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}
- $I_D = 10A$ @ $V_{GS} = 10V$
- $R_{DS(ON)} \leq 0.7\Omega$ @ $V_{GS} = 10V$

Applications

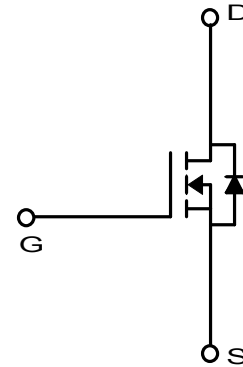
- Power Supply
- PFC
- High Current, High Speed Switching



TO-220
MDP Series



TO-220F
MDF Series



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

Characteristics		Symbol	MDP10N60G	MDF10N60G	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	10	10*	A
	$T_C=100^\circ C$		6.3	6.3*	A
Pulsed Drain Current ⁽¹⁾		I_{DM}	40	40*	A
Power Dissipation	$T_C=25^\circ C$	P_D	156	48	W
	Derate above 25 °C		1.25	0.38	W/°C
Repetitive Avalanche Energy ⁽¹⁾		E_{AR}	15.6		mJ
Peak Diode Recovery dv/dt ⁽³⁾		dv/dt	4.5		V/ns
Single Pulse Avalanche Energy ⁽⁴⁾		E_{AS}	520		mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150		°C

* I_D limited by maximum junction temperature

Thermal Characteristics

Characteristics	Symbol	MDP10N60G	MDF10N60G	Unit
Thermal Resistance, Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	62.5	62.5	°C/W
Thermal Resistance, Junction-to-Case ⁽¹⁾	$R_{\theta JC}$	0.8	2.6	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDP10N60GTH	-55~150°C	TO-220	Tube	Halogen Free
MDF10N60GTH	-55~150°C	TO-220F	Tube	Halogen Free

Electrical Characteristics (Ta =25°C)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu A, V_{GS} = 0V$	600	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	-	5.0	
Drain Cut-Off Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$	-	-	1	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 5.0A$		0.58	0.7	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 30V, I_D = 5.0A$	-	9	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 480V, I_D = 10A, V_{GS} = 10V^{(3)}$	-	32	-	nC
Gate-Source Charge	Q_{gs}		-	8.7	-	
Gate-Drain Charge	Q_{gd}		-	12.2	-	
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	1360		pF
Reverse Transfer Capacitance	C_{rss}		-	7.7		
Output Capacitance	C_{oss}		-	151		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 300V, I_D = 10A, R_G = 25\Omega^{(3)}$	-	53		ns
Rise Time	t_r		-	38		
Turn-Off Delay Time	$t_{d(off)}$		-	116		
Fall Time	t_f		-	32		
Drain-Source Body Diode Characteristics						
Maximum Continuous Drain to Source Diode Forward Current	I_S		-	10	-	A
Source-Drain Diode Forward Voltage	V_{SD}	$I_S = 10A, V_{GS} = 0V$	-		1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10A, di/dt = 100A/\mu s^{(3)}$	-	340		ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	3.3		μC

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 $T_{J(MAX)}=150^\circ C$.
- $I_{SD} \leq 10A, di/dt \leq 200A/\mu s, V_{DD}=50V, R_G = 25\Omega$, Starting $T_J=25^\circ C$
- $L=9.6mH, I_{AS}=10.0A, V_{DD}=50V, R_G = 25\Omega$, Starting $T_J=25^\circ C$,

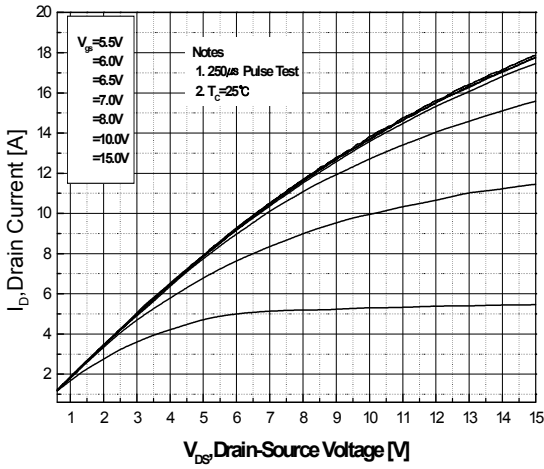


Fig.1 On-Region Characteristics

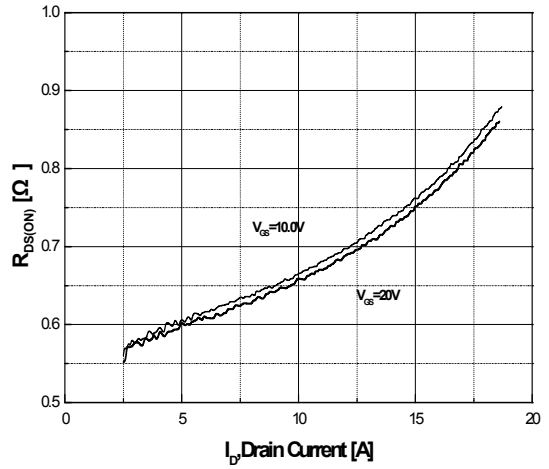


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

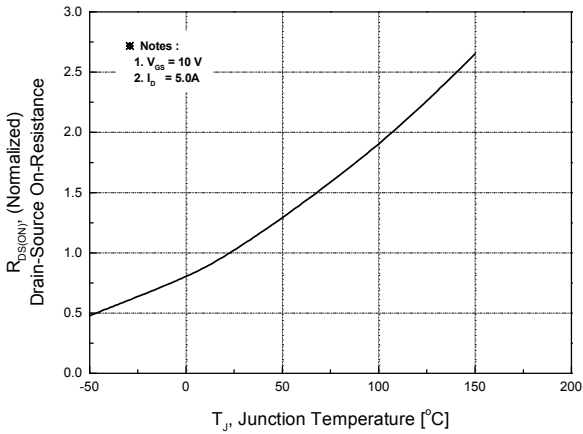


Fig.3 On-Resistance Variation with Temperature

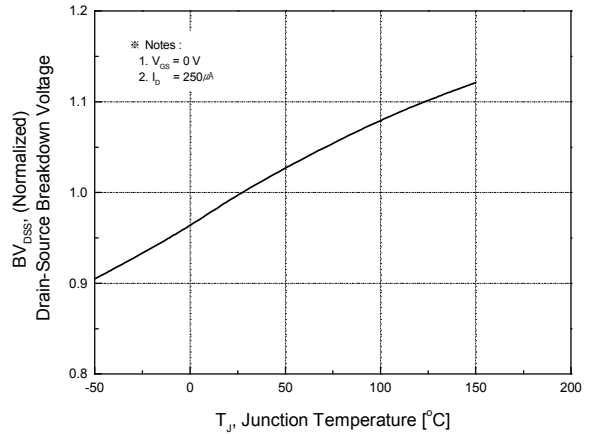


Fig.4 Breakdown Voltage Variation vs. Temperature

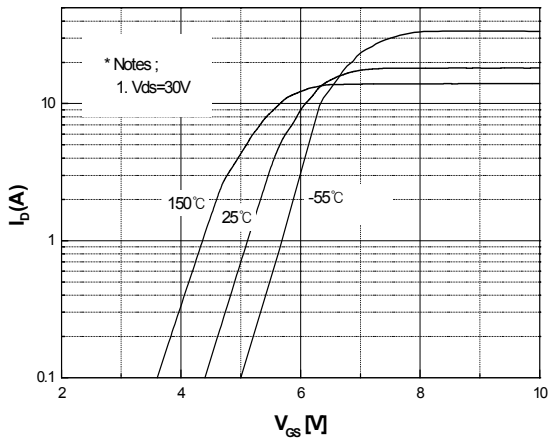


Fig.5 Transfer Characteristics

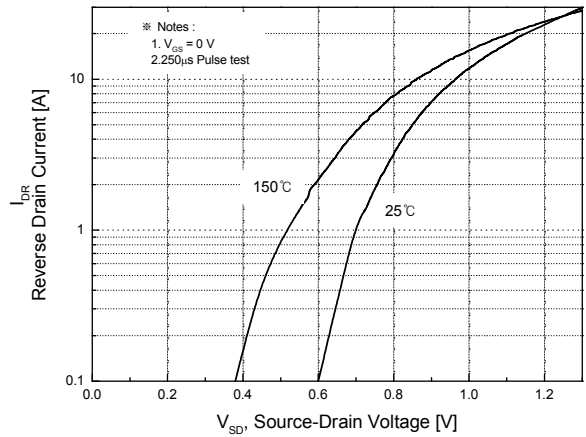


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

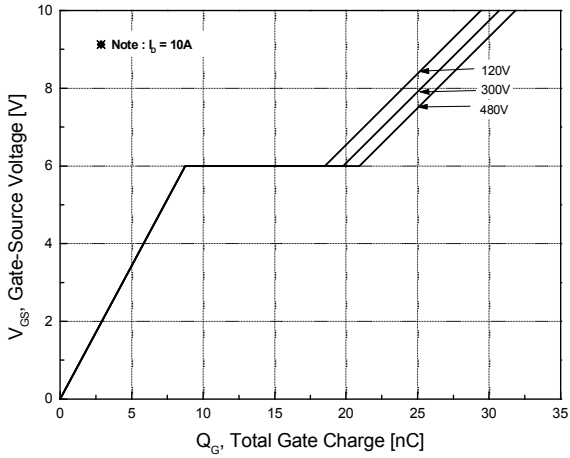


Fig.7 Gate Charge Characteristics

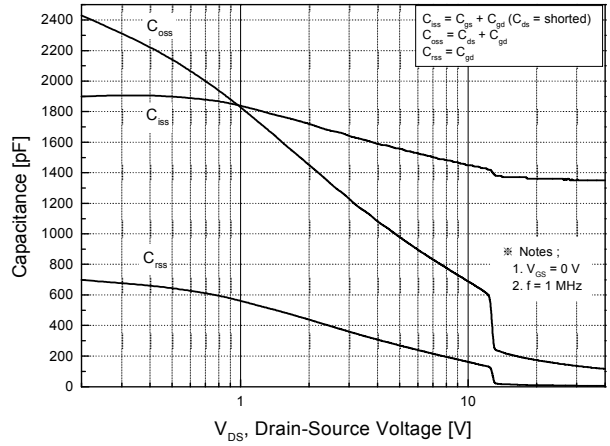
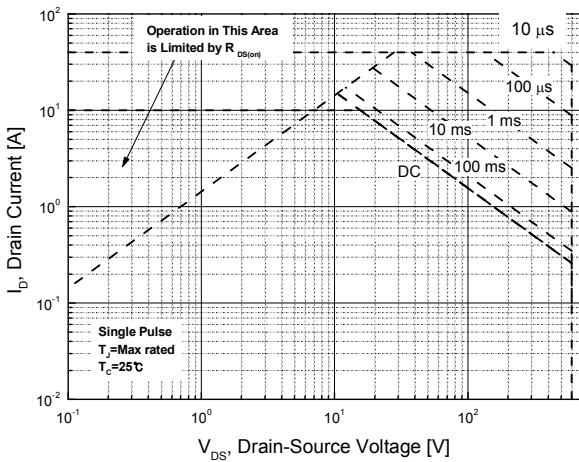
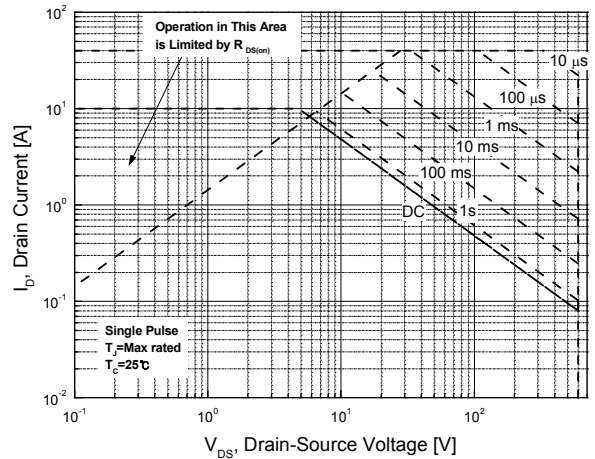


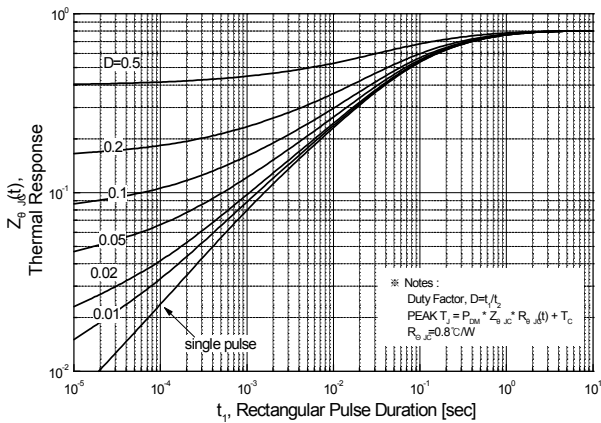
Fig.8 Capacitance Characteristics



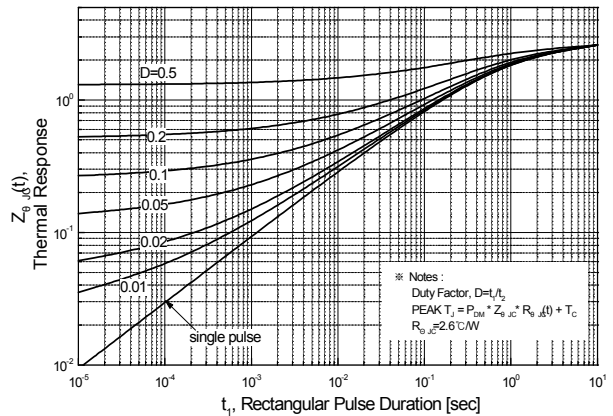
**Fig.9 Maximum Safe Operating Area
MDP10N60G(TO-220)**



**Fig.10 Maximum Safe Operating Area
MDF10N60G(TO-220F)**



**Fig.11 Transient Thermal Response Curve
MDP10N60G(TO-220)**



**Fig.12 Transient Thermal Response Curve
MDF10N60G(TO-220F)**

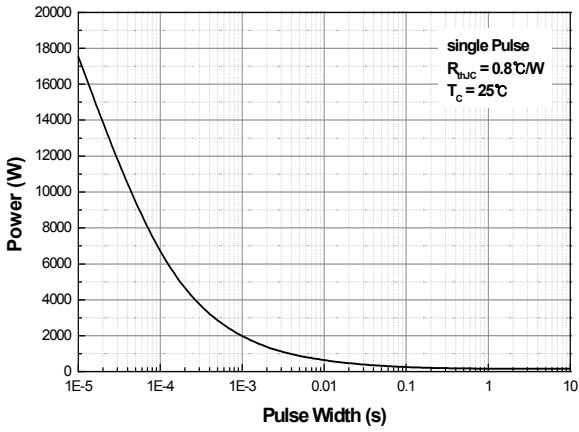


Fig.13 Single Pulse Maximum Power Dissipation MDP10N60G(TO-220)

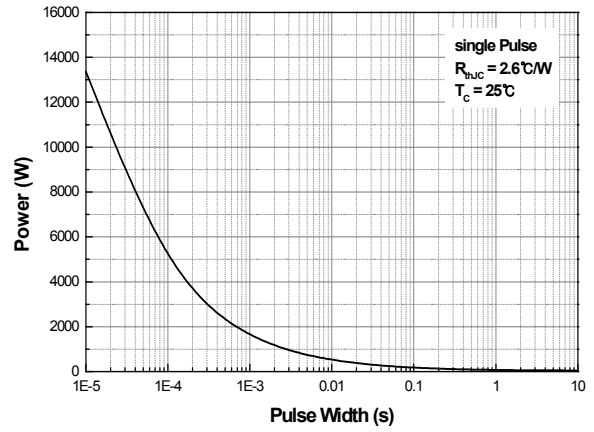


Fig.14 Single Pulse Maximum Power Dissipation MDF10N60G(TO-220F)

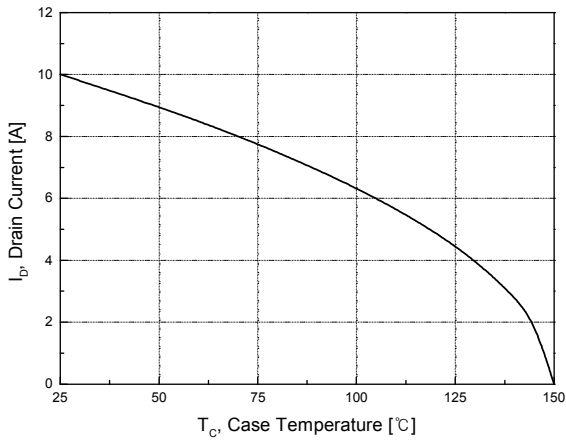
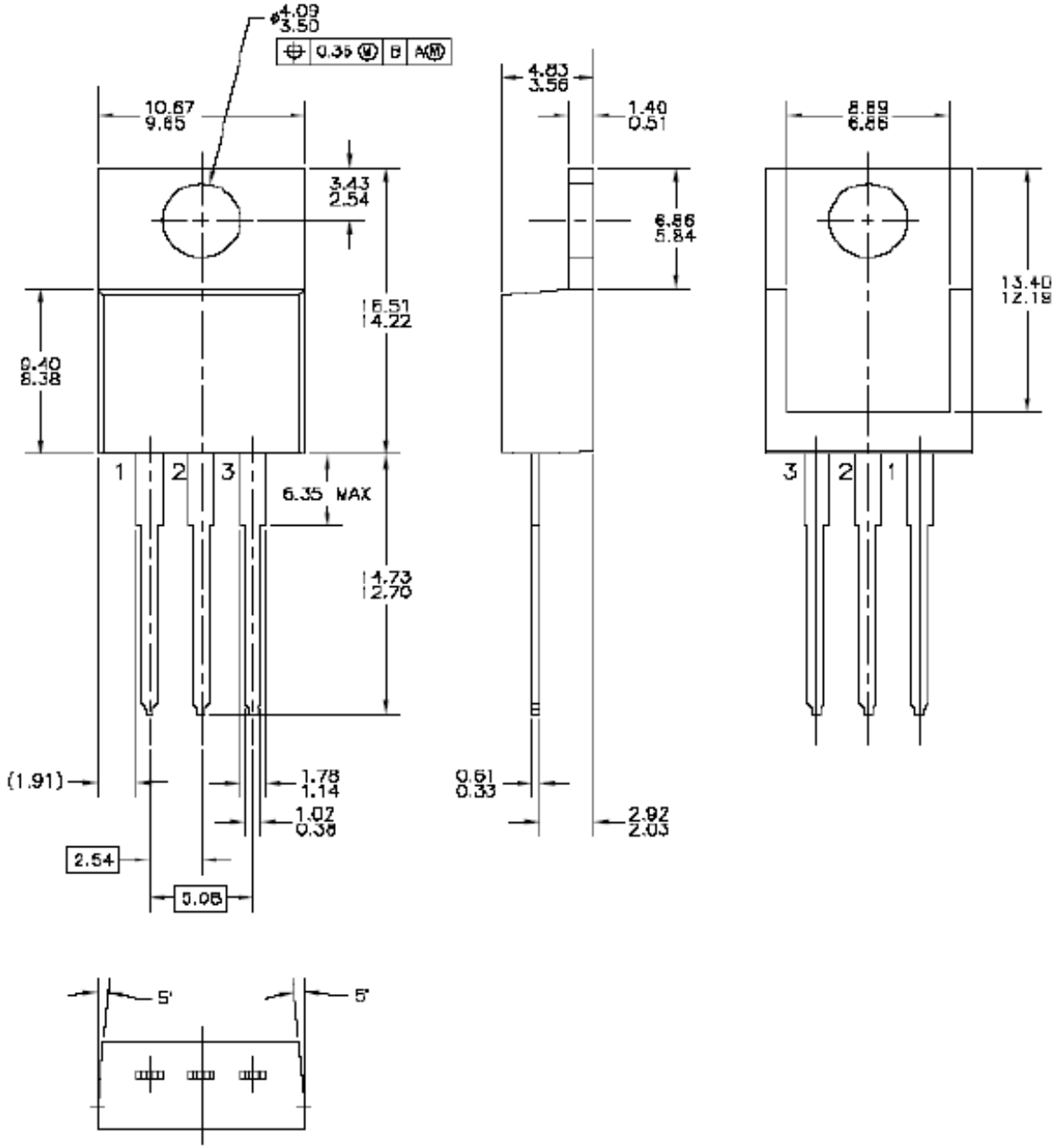


Fig.15 Maximum Drain Current vs. Case Temperature

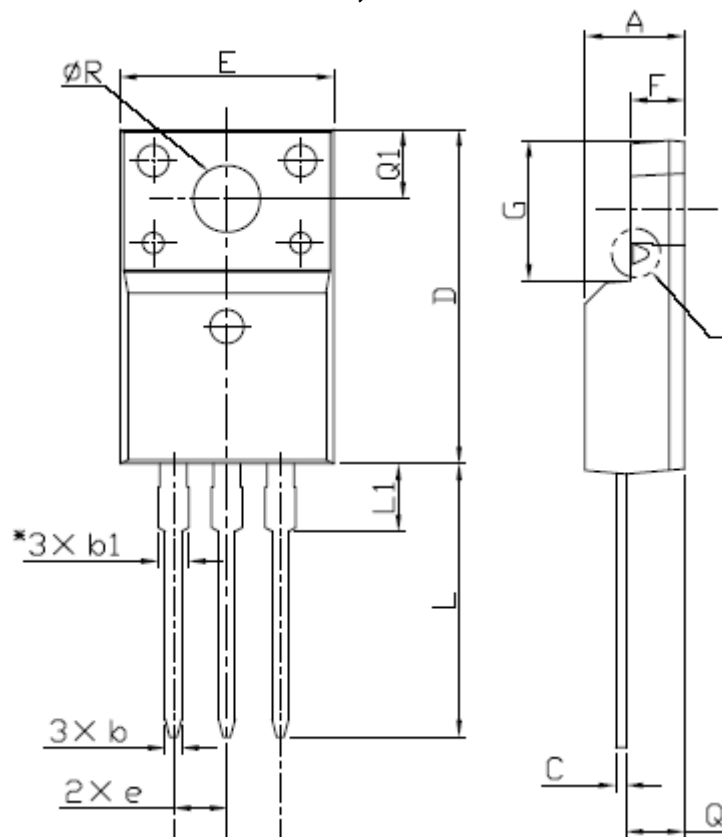
Physical Dimensions

TO-220



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
$\varnothing R$	3.00		3.55

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