

100V N-Ch Power MOSFET

Feature

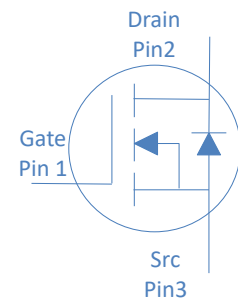
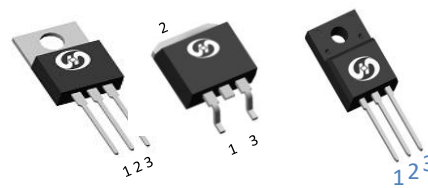
- ◇ High Speed Power Smooth Switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free

V_{DS}	100	V
$R_{DS(on),max}$	3.7	m Ω
I_D	168	A

Application

- ◇ Synchronous Rectification in SMPS
- ◇ Hard Switching and High Speed Circuit
- ◇ Power Tools
- ◇ UPS
- ◇ Motor Control

TO-220 TO-263 TO-220F



Part Number	Package	Marking
HGB037N10T	TO-263	GB037N10T
HGP037N10T	TO-220	GP037N10T
HGA037N10T	TO-220F	GA037N10T

Absolute Maximum Ratings at $T_i=25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	TO263/TO220	TO220F	Unit
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	168	168*	A
Drain to Source Voltage	V_{DS}	-	100		V
Gate to Source Voltage	V_{GS}	-	± 20		V
Pulsed Drain Current	I_{DM}	-	672	672*	A
Avalanche Energy, Single Pulse	E_{AS}	$L=1\text{mH}$, $T_C=25^\circ\text{C}$	685		mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$	188	58	W
Operating and Storage Temperature	T_J, T_{stg}	-	-55 to 175		$^\circ\text{C}$

Absolute Maximum Ratings

Parameter	Symbol	TO263/TO220	TO220F	Unit
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.8	2.6	$^\circ\text{C/W}$
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	62.5	62.5	$^\circ\text{C/W}$

Electrical Characteristics at $T_j=25^\circ\text{C}$ (unless otherwise specified)
Static Characteristics

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	-	4	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V, V_{DS}=100V, T_j=25^\circ\text{C}$	-	-	1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	3.3	3.7	$m\Omega$

Dynamic Characteristics

Input Capacitance	C_{iss}		-	3230	-	pF
Output Capacitance	C_{oss}	$V_{GS}=0V, V_{DS}=50V, f=1\text{MHz}$	-	895	-	
Reverse Transfer Capacitance	C_{riss}		-	45	-	
Total Gate Charge	$Q_g (10V)$		-	88	-	nC
Gate to Source Charge	Q_{gs}	$V_{DD}=50V, I_D=20A, V_{GS}=10V$	-	17	-	
Gate to Drain (Miller) Charge	Q_{gd}		-	31	-	
Turn on Delay Time	$t_{d(on)}$		-	38	-	ns
Rise time	t_r	$V_{DD}=50V, I_D=20A, V_{GS}=10V,$	-	30	-	
Turn off Delay Time	$t_{d(off)}$	$R_G=10\Omega,$	-	86	-	
Fall Time	t_f		-	61	-	

Reverse Diode Characteristics

Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_F=10A$	-	-	1.5	V
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Fig 1. Typical Output Characteristics

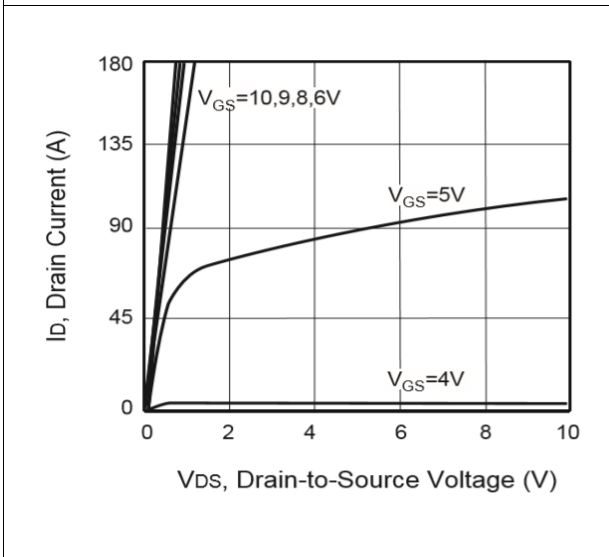


Figure 2. Normalized Threshold Voltage vs. Junction Temperature

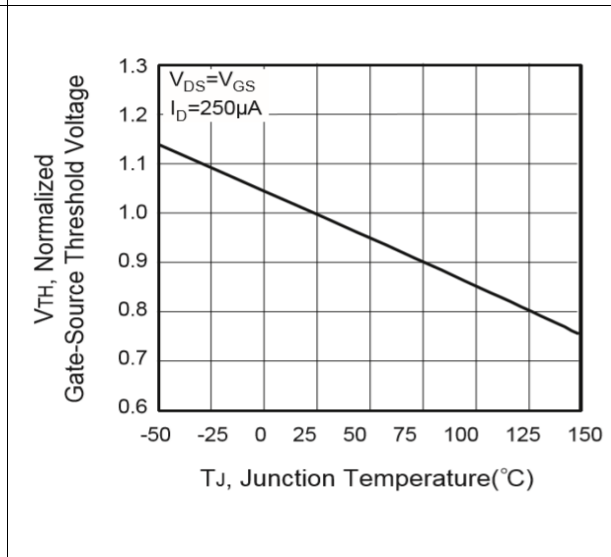


Figure 3. Maximum Safe Operating Area

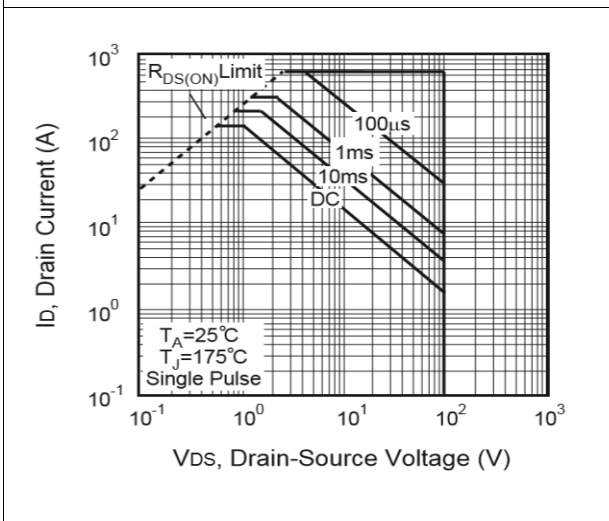


Figure 4. Normalized On-Resistance vs. Junction Temperature

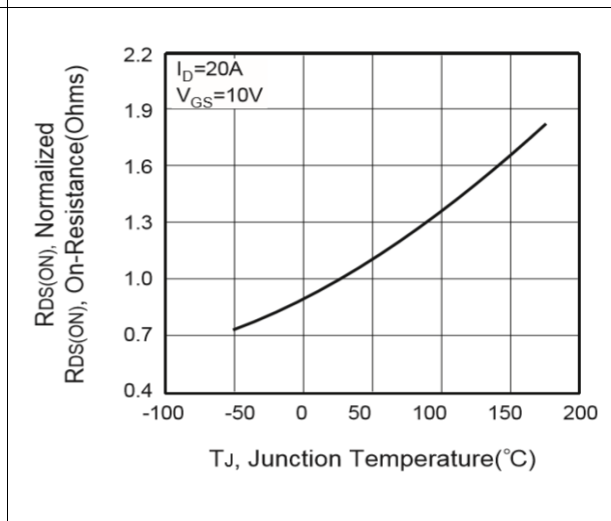


Figure 5. Typical Transfer Characteristics

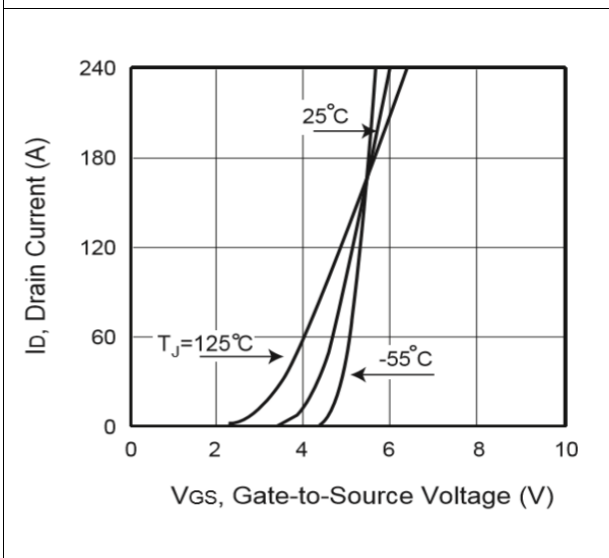


Figure 6. Typical Source-Drain Diode Forward Voltage

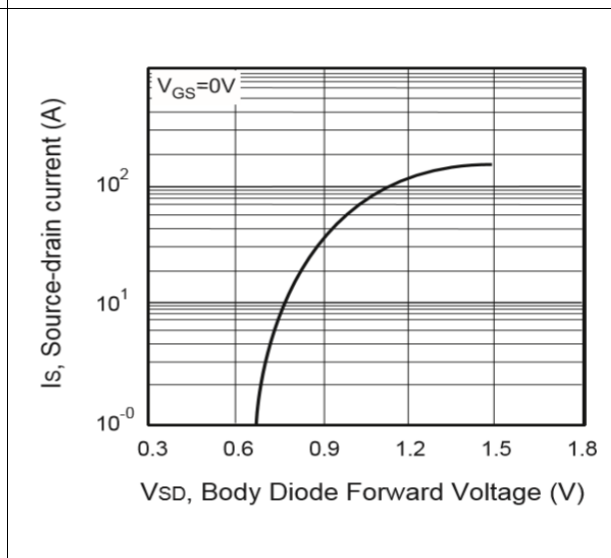


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

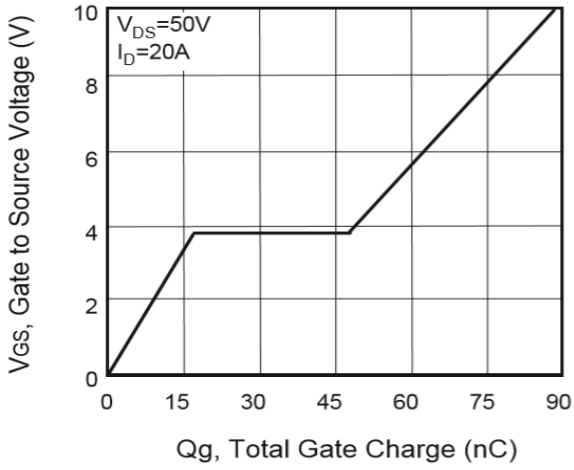


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

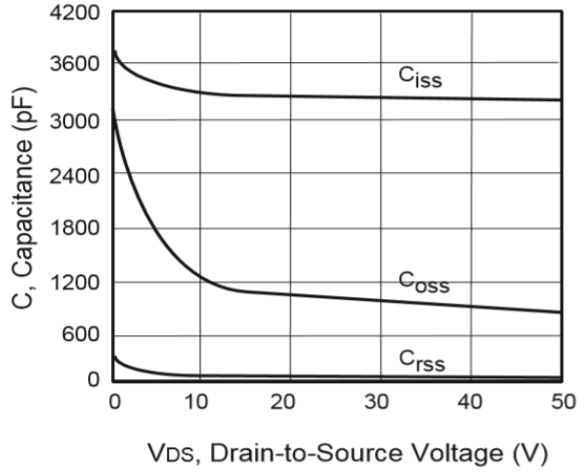
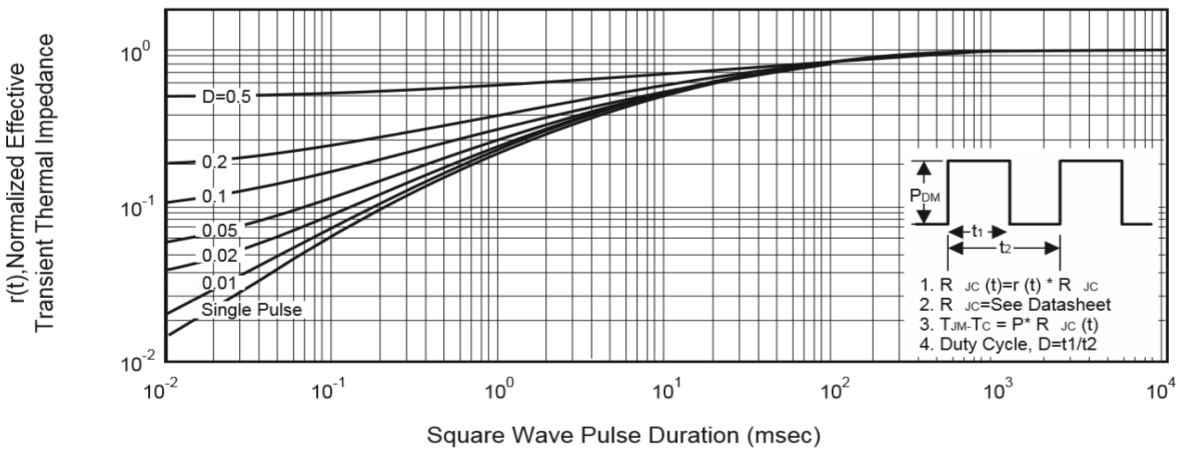
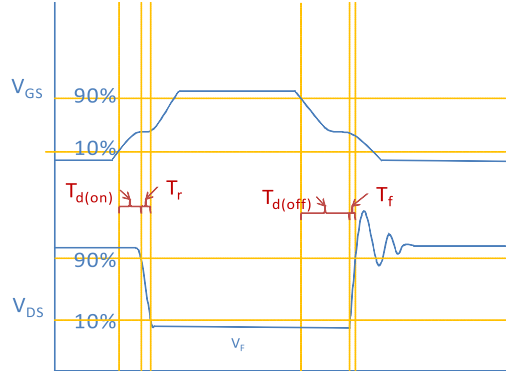
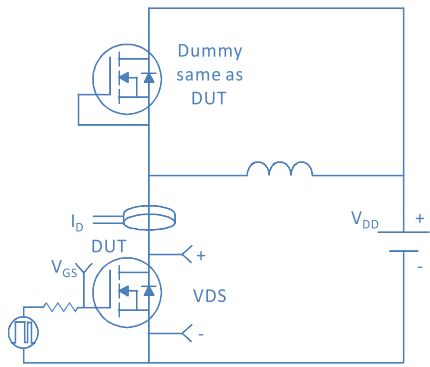


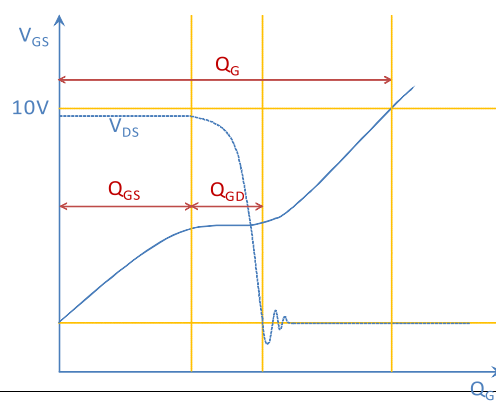
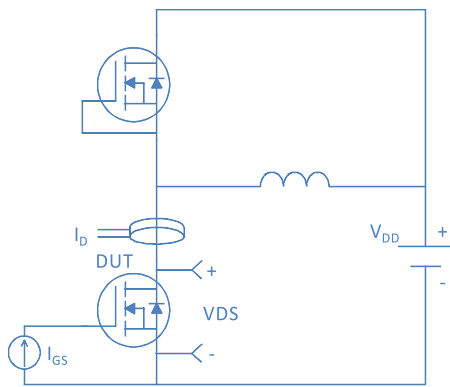
Figure 9. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



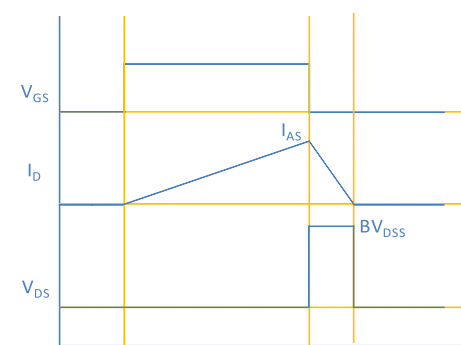
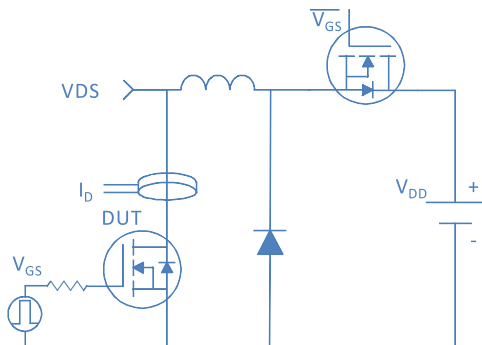
Inductive switching Test



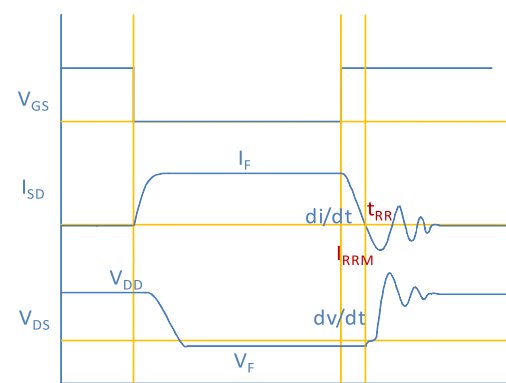
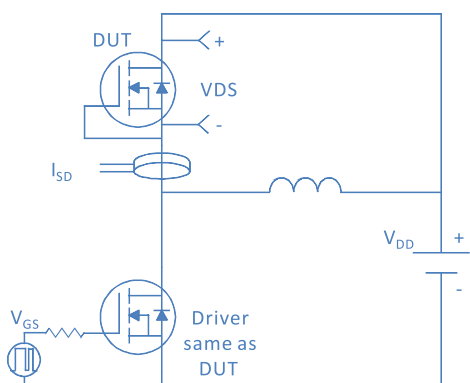
Gate Charge Test

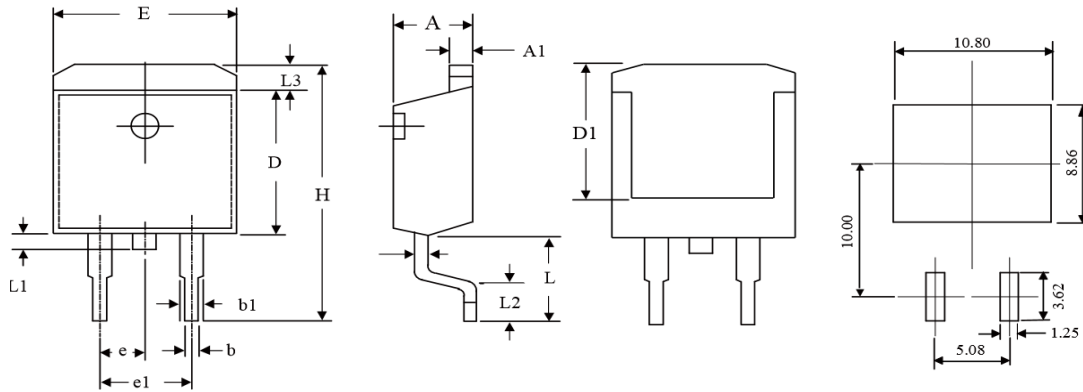


Uclamped Inductive Switching (UIS) Test

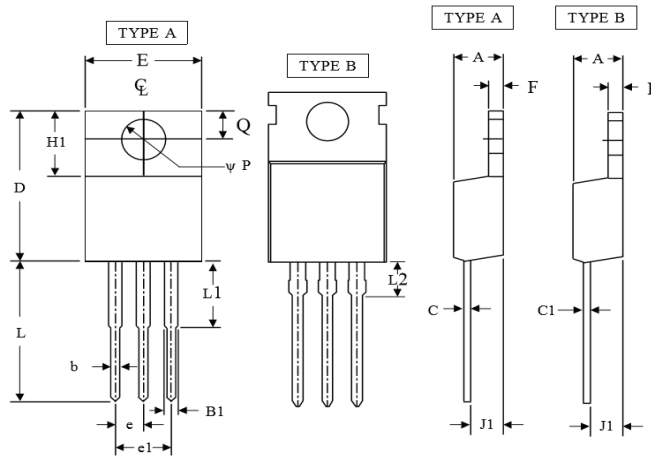


Diode Recovery Test

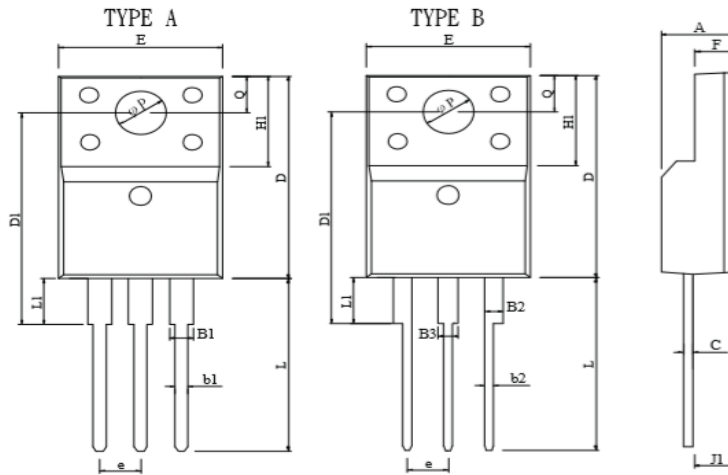


TO-263, 3 leads


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.290	4.700	0.169	0.185
A1	1.220	1.40	0.048	0.055
b	0.690	0.940	0.027	0.037
b1	1.220	1.400	0.048	0.055
C	0.360	0.560	0.014	0.022
D	8.640	9.650	0.340	0.380
D1	7.530	8.230	0.296	0.324
E	9.700	10.540	0.382	0.415
e	2.290	2.790	0.090	0.110
e1	4.830	5.330	0.190	0.210
H	14.610	15.880	0.575	0.625
L	4.600	5.50	0.181	0.217
L1	1.190	1.780	0.047	0.070
L2	2.240	2.820	0.088	0.111
L3	1.400 MAX		0.055 MAX	

TO-220, 3 leads (Type B)


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.320	4.826	0.170	0.190
B1	1.143	1.778	0.045	0.070
b	0.610	0.910	0.024	0.036
c	0.356	0.530	0.014	0.021
c1	0.45	0.61	0.018	0.024
D	14.224	16.510	0.560	0.650
E	9.652	10.668	0.380	0.420
e	2.540 BSC		0.100 BSC	
e1	5.080 BSC		0.200 BSC	
F	1.220	1.397	0.048	0.055
H1	5.842	6.858	0.230	0.270
J1	2.032	2.921	0.080	0.115
L	12.700	14.732	0.500	0.580
L1	3.400	4.000	0.134	0.150
L2	2.70	3.20	0.106	0.126
ϕ P	3.530	4.090	0.139	0.161
Q	2.540	3.429	0.100	0.135

TO-220F, 3 leads (Type B)


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.500	5.000	0.177	0.197
B1	1.000	1.500	0.039	0.059
B2	1.030	1.330	0.041	0.052
B3	1.000	1.300	0.039	0.051
b1	0.700	0.950	0.028	0.037
b2	0.530	0.780	0.021	0.031
C	0.42	0.7	0.017	0.028
D	15.670	16.070	0.617	0.633
D1	14.800	16.000	0.583	0.630
E	9.960	10.360	0.392	0.408
e	2.340	2.740	0.092	0.108
F	2.340	2.740	0.092	0.108
H1	6.480	6.90	0.255	0.272
J1	2.550	2.950	0.100	0.116
L	12.080	13.480	0.476	0.531
L1 ^{註1}	2.230	3.650	0.088	0.144
Q	3.100	3.500	0.122	0.138
φP	2.980	3.380	0.117	0.133

註1 For MXM short lead-frame, L1 dimension is 2.0±0.2mm, used for Part NO. ended with "S"