

GENERAL DESCRIPTION

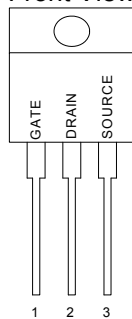
This advanced high voltage MOSFET is designed to withstand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode with fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, converters, power motor controls and bridge circuits.

FEATURES

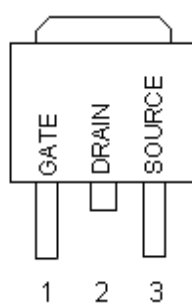
- ◆ Higher Current Rating
- ◆ Lower $R_{ds(on)}$
- ◆ Lower Capacitances
- ◆ Lower Total Gate Charge
- ◆ Tighter VSD Specifications
- ◆ Avalanche Energy Specified

PIN CONFIGURATION

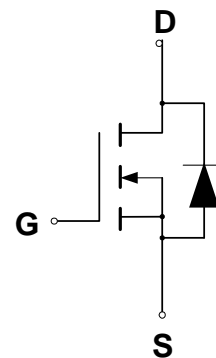
TO-220/TO-220FP
Front View



TO-252
Front View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	4.0	A
— Pulsed	I_{DM}	14	
Gate-to-Source Voltage — Continue	V_{GS}	± 30	V
— Non-repetitive	V_{GSM}	± 40	V
Total Power Dissipation	P_D		W
TO-220		83	
TO-220FP		30	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^{\circ}\text{C}$
Single Pulse Drain-to-Source Avalanche Energy — $T_J = 25^{\circ}\text{C}$ ($V_{DD} = 100\text{V}$, $V_{GS} = 10\text{V}$, $I_L = 4\text{A}$, $L = 10\text{mH}$, $R_G = 25\Omega$)	E_{AS}	80	mJ
Thermal Resistance — Junction to Case	θ_{JC}	1.30	$^{\circ}\text{C}/\text{W}$
— Junction to Ambient	θ_{JA}	100	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^{\circ}\text{C}$

ORDERING INFORMATION

Part Number	Package
CMT04N60GN220*	TO-220
CMT04N60XN220*	TO-220
CMT04N60GN220FP*	TO-220 Full Package
CMT04N60XN220FP*	TO-220 Full Package
CMT04N60GN252*	TO-252
CMT04N60XN252*	TO-252

*Note: G : Suffix for Pb Free Product

X : Suffix for Halogen and Pb Free Product

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_J = 25^\circ\text{C}$.)

		CMT04N60			
Characteristic	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage ($V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$)	$V_{(BR)DSS}$	600			V
Drain-Source Leakage Current ($V_{DS} = 600\text{ V}$, $V_{GS} = 0\text{ V}$)	I_{DSS}			1	μA
Gate-Source Leakage Current-Forward ($V_{gsf} = 30\text{ V}$, $V_{DS} = 0\text{ V}$)	I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse ($V_{gsr} = -30\text{ V}$, $V_{DS} = 0\text{ V}$)	I_{GSSR}			100	nA
Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$)	$V_{GS(th)}$	2.0		4.0	V
Static Drain-Source On-Resistance ($V_{GS} = 10\text{ V}$, $I_D = 2.0\text{ A}$) *	$R_{DS(on)}$			2.2	Ω
Forward Transconductance ($V_{DS} = 50\text{ V}$, $I_D = 2.0\text{ A}$) *	g_{FS}	2.5			mhos
Input Capacitance	$(V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$)	C_{iss}	540	760	pF
Output Capacitance		C_{oss}	125	180	pF
Reverse Transfer Capacitance		C_{rss}	8.0	20	pF
Turn-On Delay Time	$(V_{DD} = 300\text{ V}$, $I_D = 4.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 9.1\Omega$) *	$t_{d(on)}$	12	20	ns
Rise Time		t_r	7.0	10	ns
Turn-Off Delay Time		$t_{d(off)}$	19	40	ns
Fall Time		t_f	10	20	ns
Total Gate Charge	$(V_{DS} = 480\text{ V}$, $I_D = 4.0\text{ A}$, $V_{GS} = 10\text{ V}$) *	Q_g	5.0	10	nC
Gate-Source Charge		Q_{gs}	2.7		nC
Gate-Drain Charge		Q_{gd}	2.0		nC
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)	L_D		4.5		nH
Internal Drain Inductance (Measured from the source lead 0.25" from package to source bond pad)	L_S		7.5		nH
SOURCE-DRAIN DIODE CHARACTERISTICS					
Forward On-Voltage(1)	$(I_S = 4.0\text{ A}$, $d_iS/d_t = 100\text{ A}/\mu\text{s}$)	V_{SD}		1.5	V
Forward Turn-On Time		t_{on}	**		ns
Reverse Recovery Time		t_{rr}	655		ns

* Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

** Negligible, Dominated by circuit inductance

TYPICAL CHARACTERISTICS

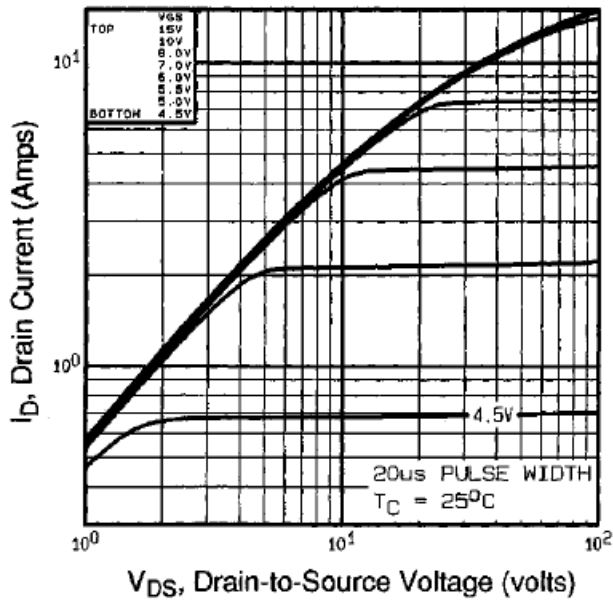


Fig 1. Typical Output Characteristics,
 $T_C = 25^\circ\text{C}$

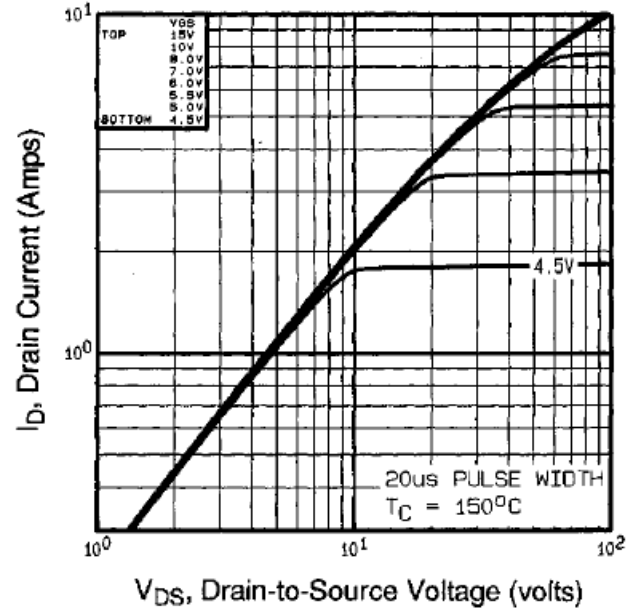


Fig 2. Typical Output Characteristics,
 $T_C = 150^\circ\text{C}$

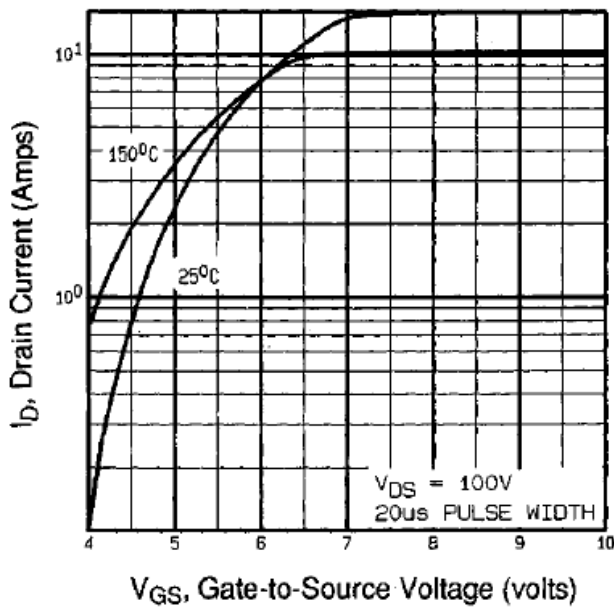


Fig 3. Typical Transfer Characteristics

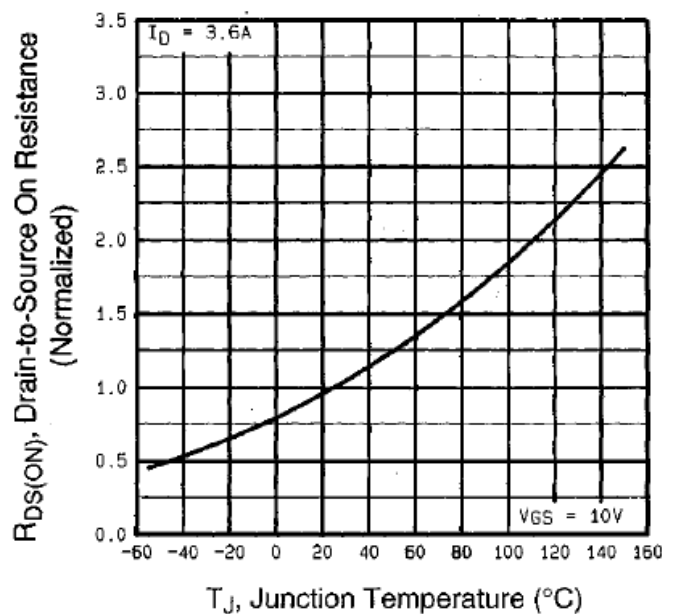


Fig 4. Normalized On-Resistance
Vs. Temperature

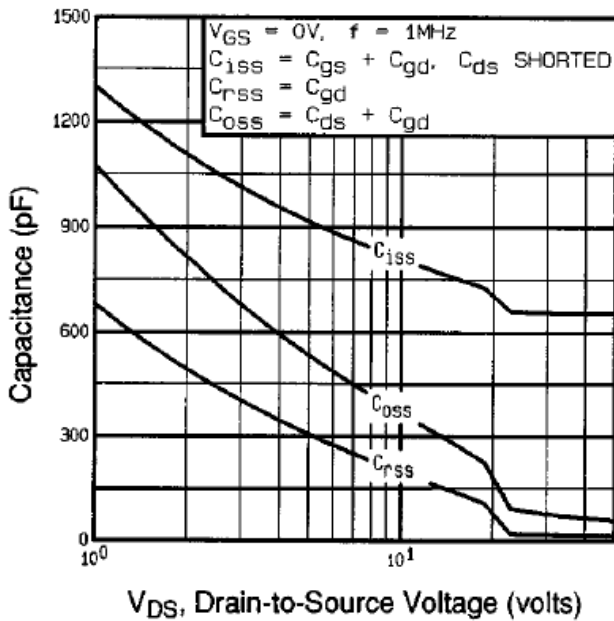


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

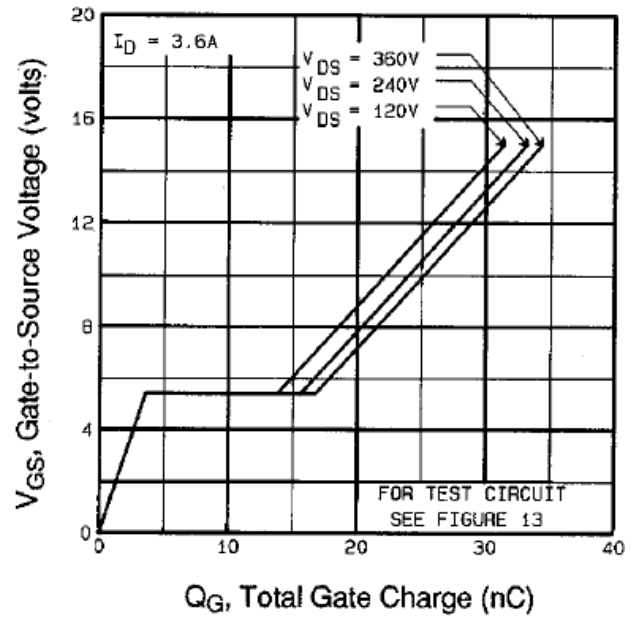


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

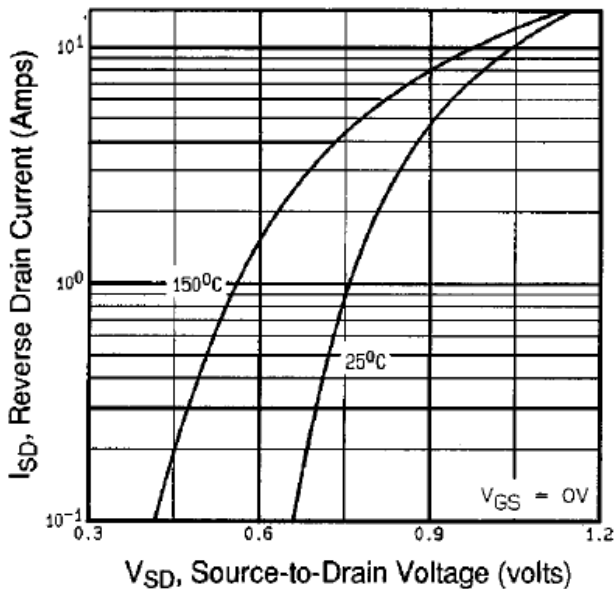


Fig 7. Typical Source-Drain Diode Forward Voltage

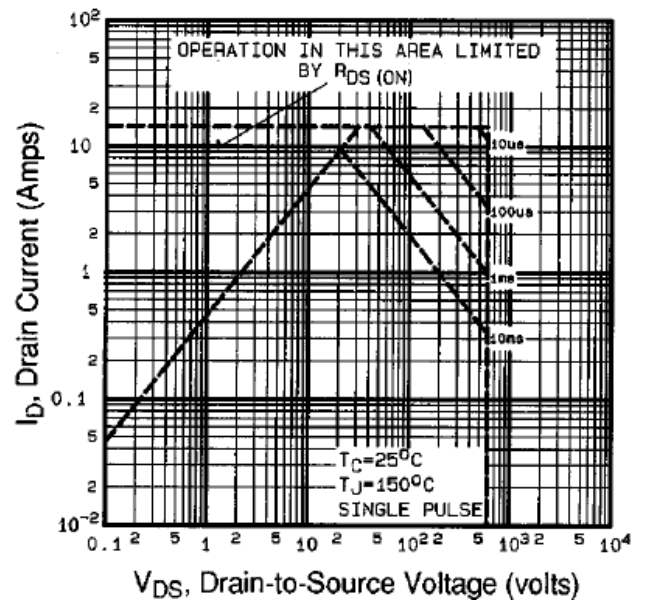
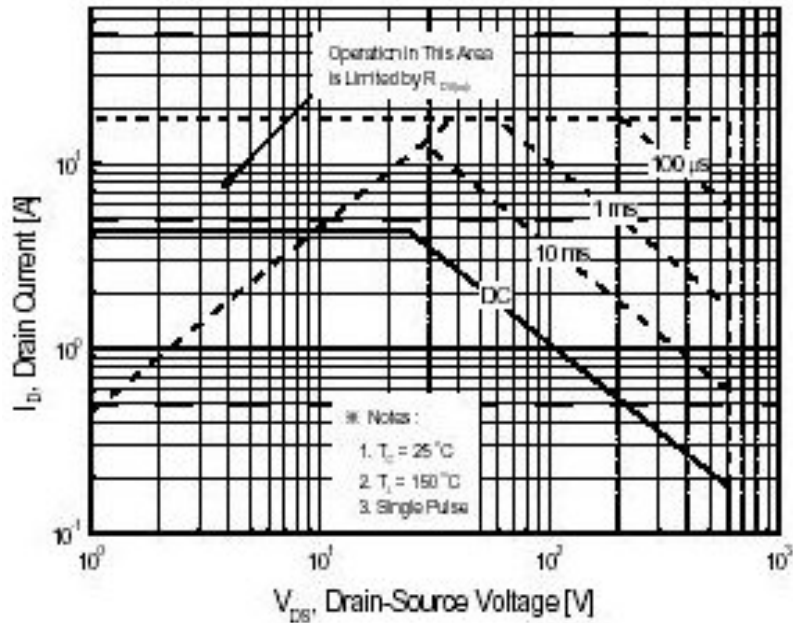
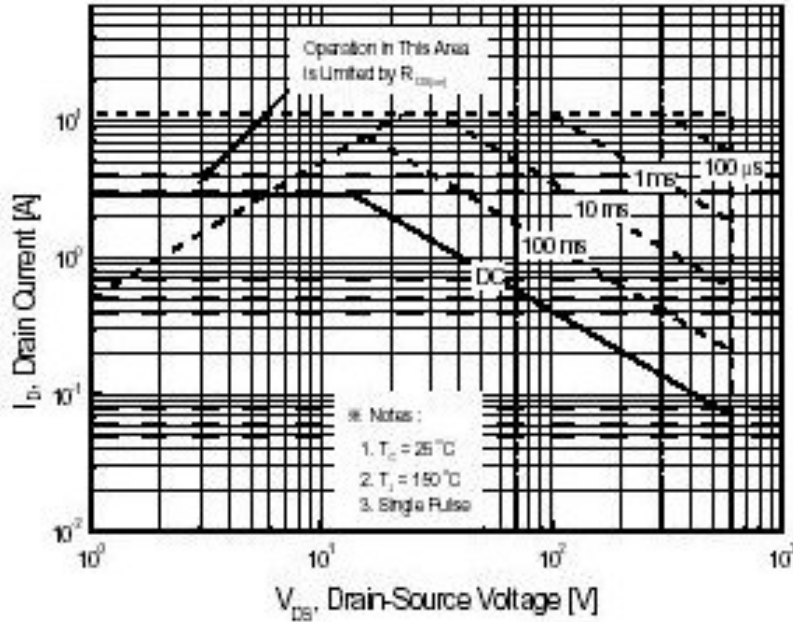


Fig 8. Maximum Safe Operating Area



Maximum Safe Operating Area

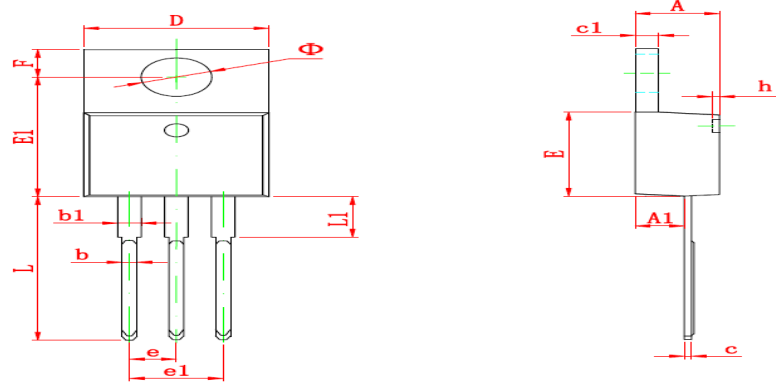
TO-220



Maximum Safe Operating Area

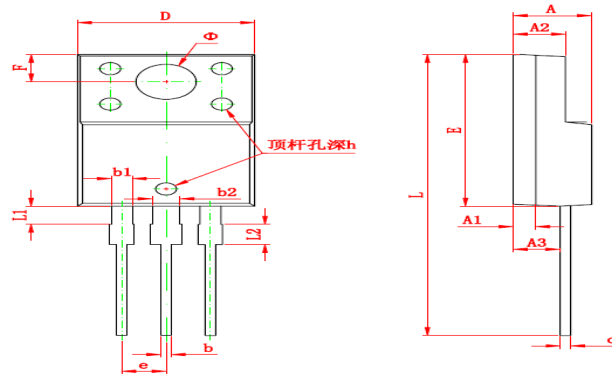
PACKAGE DIMENSION

TO-220

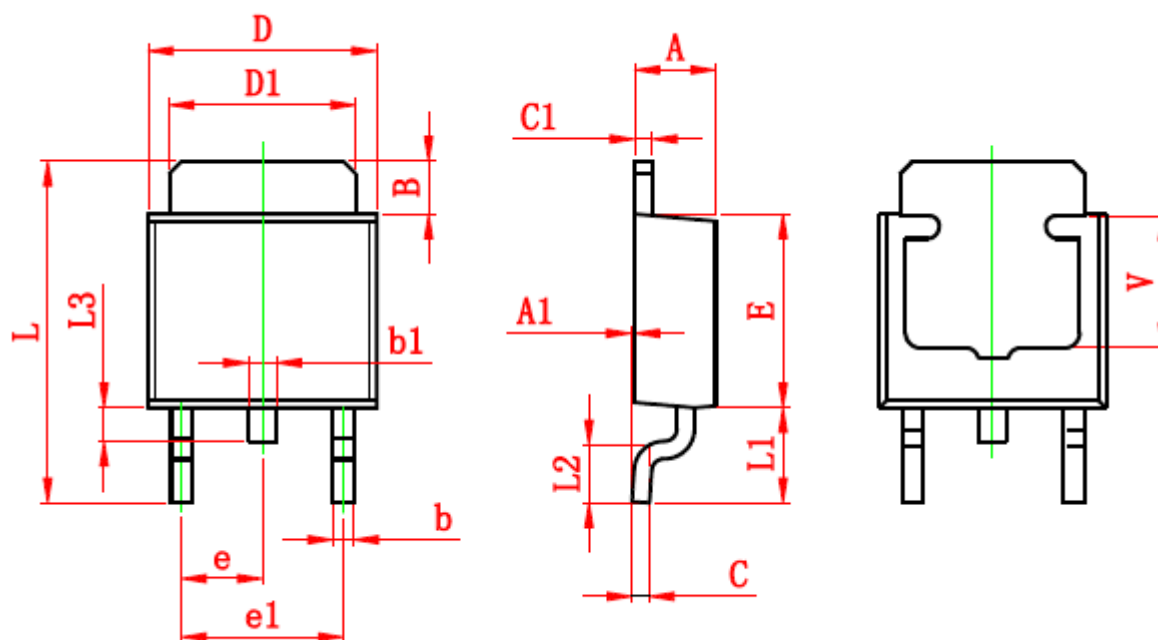


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
Φ	3.735	3.935	0.147	0.155

TO-220FP



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.300	4.700	0.169	0.185
A1	1.300 REF		0.051 REF	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP		0.100 TYP	
e1	2.700 REF		0.106 REF	
Φ	3.500 REF		0.138 REF	
h	0.000	0.300	0.000	0.012
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	1.900	2.100	0.075	0.083

TO-252


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF.		0.150 REF.	

IMPORTANT NOTICE

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