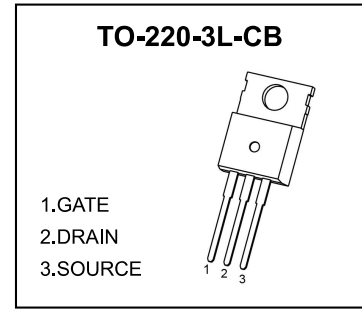


TO-220-3L-CB Plastic-Encapsulate MOSFET

CJP021SN15MK N-Channel Power MOSFET

Key Performance Parameters

V_{BR(DSS)}	R_{DS(on)TYP}	I_D
150V	17mΩ@10V	60A



DESCRIPTION

The N-Channel enhancement mode power field effect transistors is using SGT technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

FEATURES

- 100% Avalanche tested
- Low drain-source on-resistance
- Low gate charge
- High current capability

APPLICATIONS

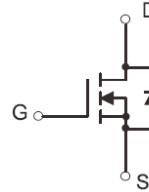
- DC/DC
- Switching application

MARKING



XXXXXX = 021SN15MK
 Solid dot = Green molding compound device.
 YYYY = Code.

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	150	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current	I _D	T _C =25°C	60
		T _C =100°C	38
Pulsed Drain Current	I _{DM} ^{①②}	240	A
Continuous Drain Current	I _D	T _A =25°C	6.1
		T _A =75°C	4.7
Avalanche Current	I _{AS} ^③	22	A
Single Pulsed Avalanche Energy	E _{AS} ^③	121	mJ
Power Dissipation	P _D ^①	179	W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55~+150	°C

Thermal Characteristics

Parameter	Symbol	Value		Unit
		Typ	Max	
Thermal Resistance from Junction to Case	R _{θJC}	0.45	0.70	°C/W
Thermal Resistance from Junction to Ambient	R _{θJA} ^⑥	50	75	°C/W

Typical Characteristics

ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise specified)

Static Characteristics

Parameter	Symbol	Test Condition	Value			Unit	
			Min	Typ	Max		
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	150	-	-	V	
Zero gate voltage drain current	I _{DSS}	V _{DS} =150V, V _{GS} =0V	T _J =25°C	-	-	1.0	μA
			T _J =125°C	-	-	100	
Gate-body leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA	
Gate-threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0	3.0	4.0	V	
Static drain-source on-state resistance	R _{DS(on)} ^④	V _{GS} =10V, I _D =20A	T _J =25°C	-	17	21	mΩ
			T _J =125°C	-	32	40	
Forward transconductance	g _{FS}	V _{DS} =5V, I _D =20A	-	46	-	S	

Dynamic Characteristics^⑤

Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =75V, f=1MHz	-	1970	-	pF
Output capacitance	C _{oss}		-	146	-	
Reverse transfer capacitance	C _{rss}		-	2	-	
Gate resistance	R _g	f=1MHz	-	2.6	-	Ω
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =75V, I _D =20A	-	24.7	-	nC
Gate charge at threshold	Q _{G(th)}		-	5.6	-	
Gate-source charge	Q _{gs}		-	8.4	-	
Gate-drain charge	Q _{gd}		-	3.6	-	
Turn-on delay time	t _{d(on)}	V _{DD} =75V, V _{GS} =10V, I _D =20A, R _g =15Ω	-	22	-	ns
Turn-on rise time	t _r		-	24	-	
Turn-off delay time	t _{d(off)}		-	42	-	
Turn-off fall time	t _f		-	31	-	

Reverse Diode Characteristics

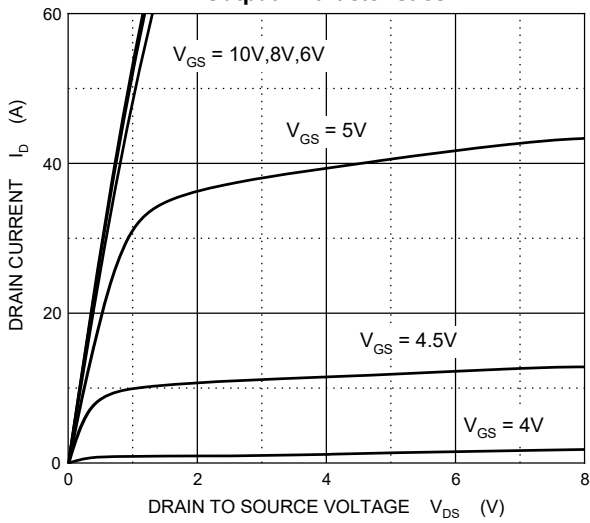
Drain-source diode forward voltage	V _{SD} ^④	V _{GS} =0V, I _S =20A	-	-	1.2	V
Continuous drain-source diode forward current	I _S ^①		-	-	60	A
Pulsed drain-source diode forward current	I _{SM} ^{①②}		-	-	240	A
Reverse recovery time	t _{rr}	V _{DD} =75V, I _S =20A,	-	88	-	ns
Reverse recovery charge	Q _{rr}	di/dt=100A/μs	-	129	-	nC

Notes:

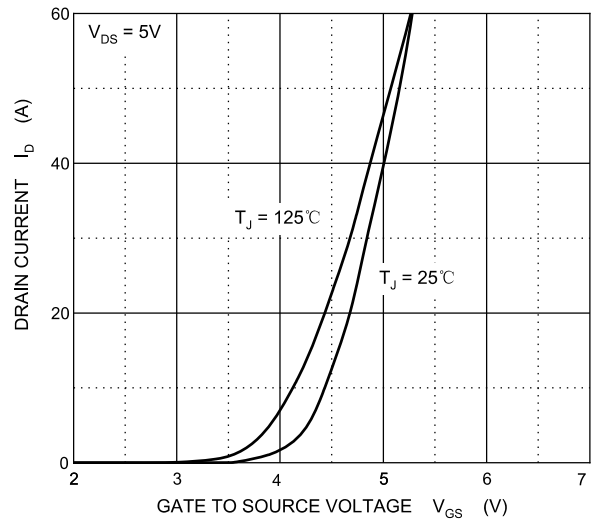
- ①. T_C=25°C Limited only by maximum temperature allowed.
- ②. P_W≤10μs, Duty cycle ≤1%.
- ③. EAS condition: V_{DD}=75V, V_{GS}=10V, L=0.5mH, R_g=25Ω Starting T_J=25°C.
- ④. Pulse Test : Pulse Width ≤380μs, duty cycle ≤2%.
- ⑤. Guaranteed by design, not subject to production.
- ⑥. Device mounted in a still air environment with T_A=25°C.

Typical Characteristics

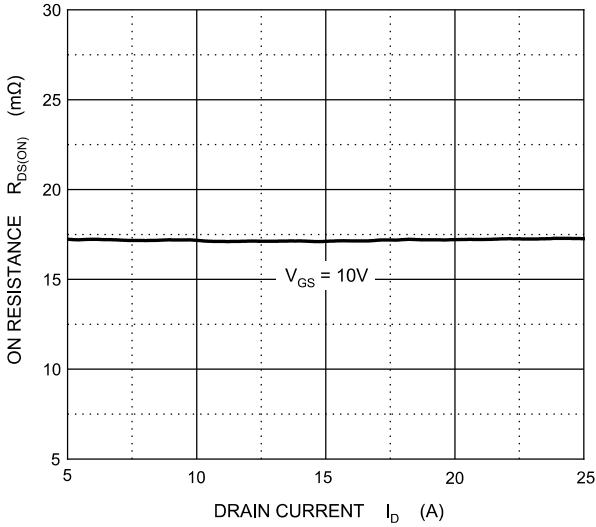
Output Characteristics



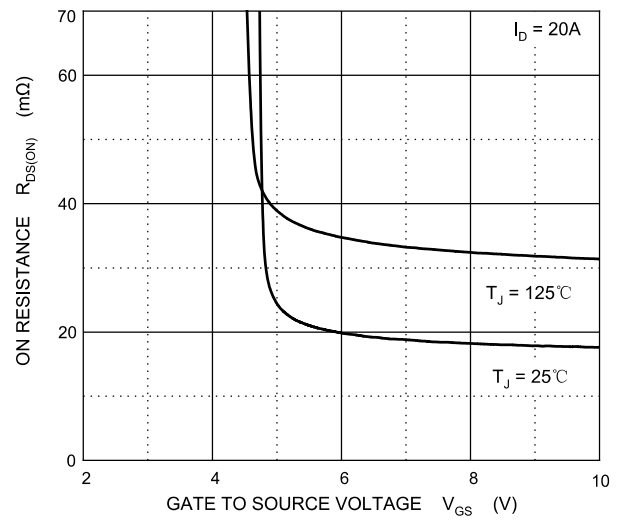
Transfer Characteristics



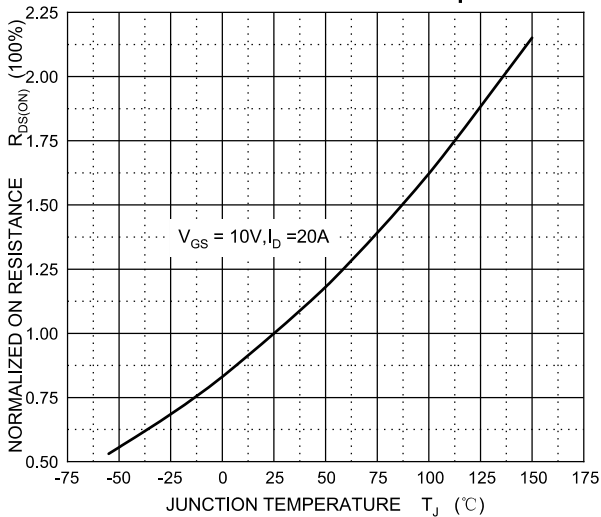
On Resistance vs. Drain Current



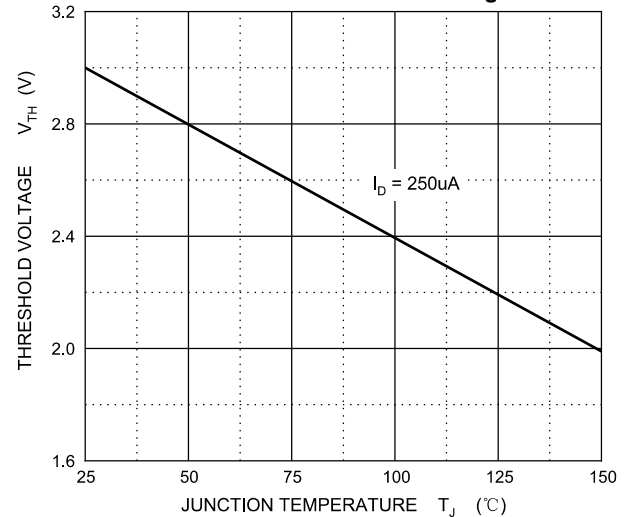
On Resistance vs. Gate-Source Bias



On Resistance vs. Junction Temperature

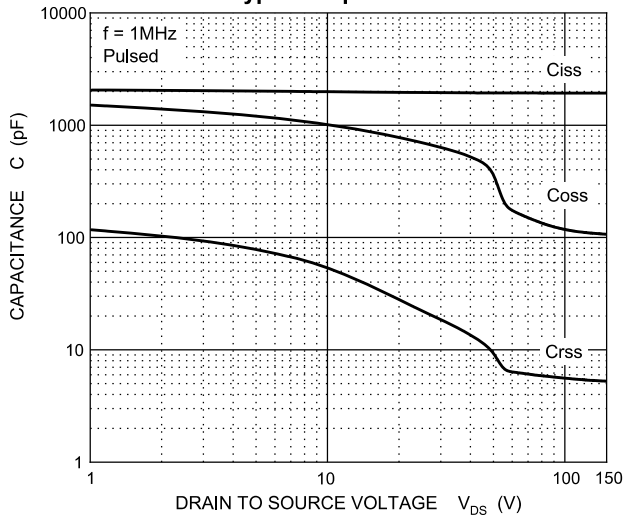


Gate-Source Threshold Voltage

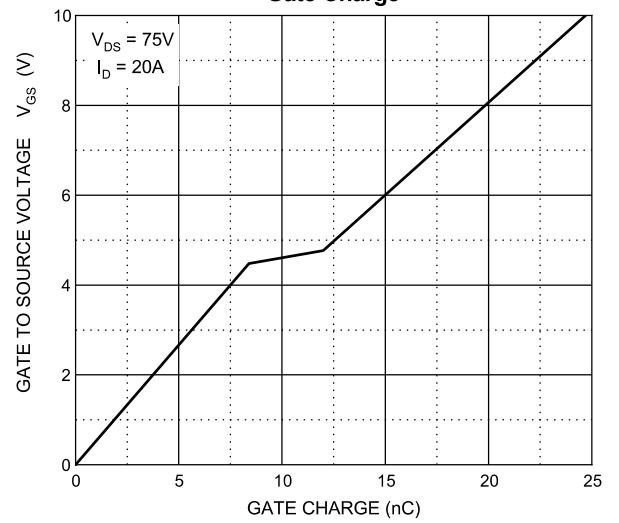


Typical Characteristics

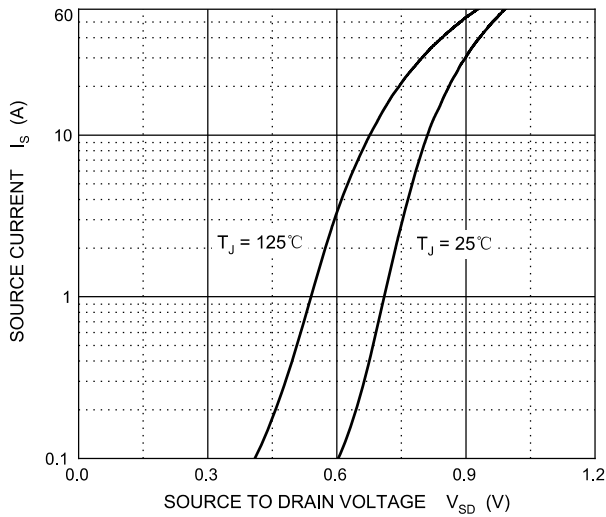
Typical Capacitances



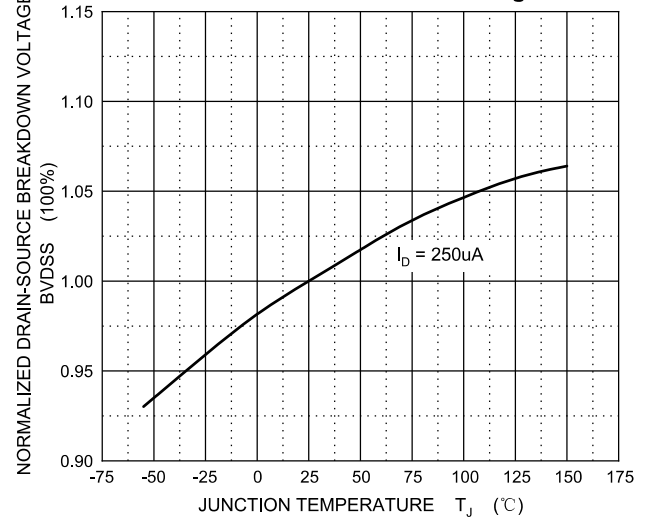
Gate Charge



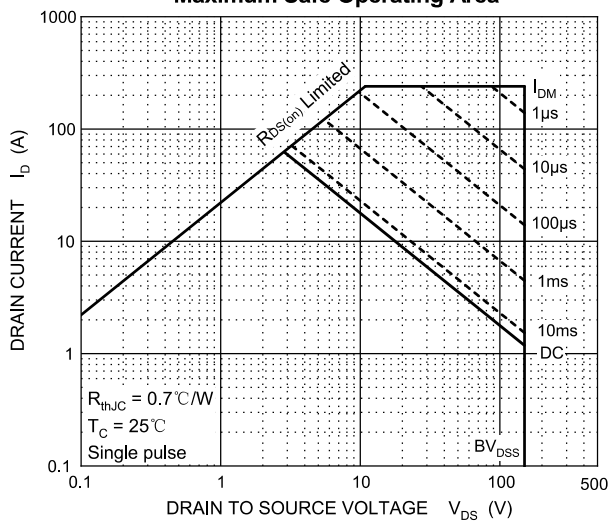
Source-Drain Diode Forward Characteristics



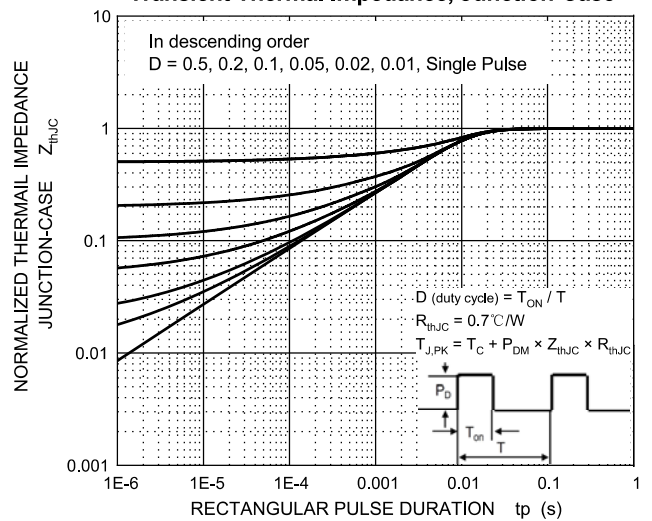
Drain-Source Breakdown Voltage



Maximum Safe Operating Area

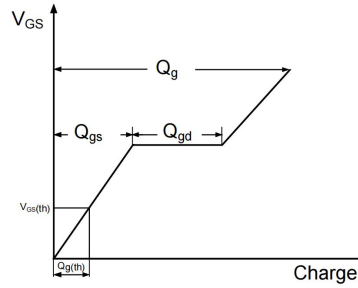
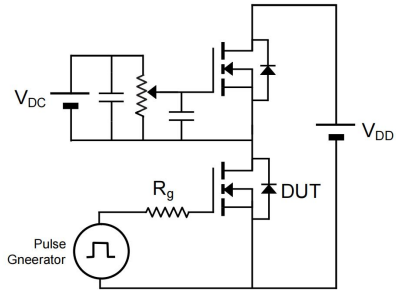


Transient Thermal Impedance, Junction-Case

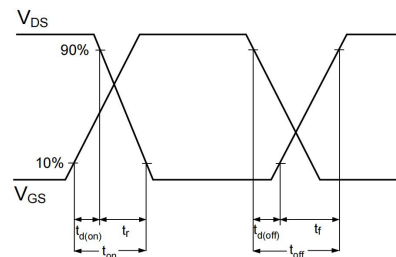
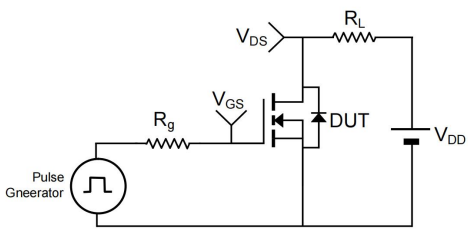


Test Circuit And Waveforms

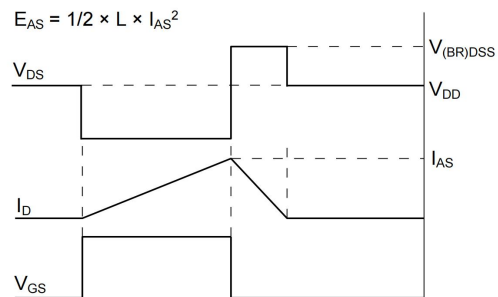
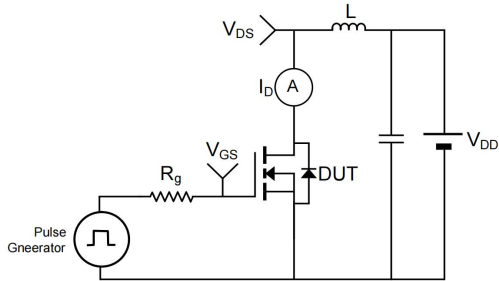
Gate Charge



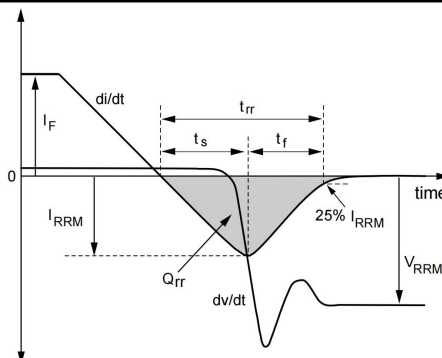
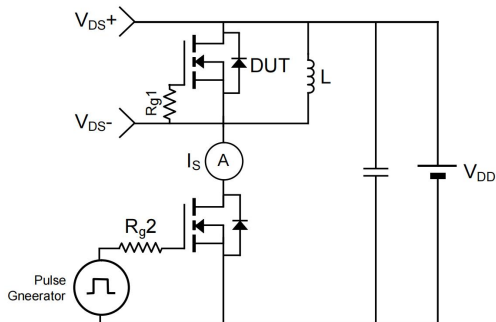
Resistive Load Switching Time



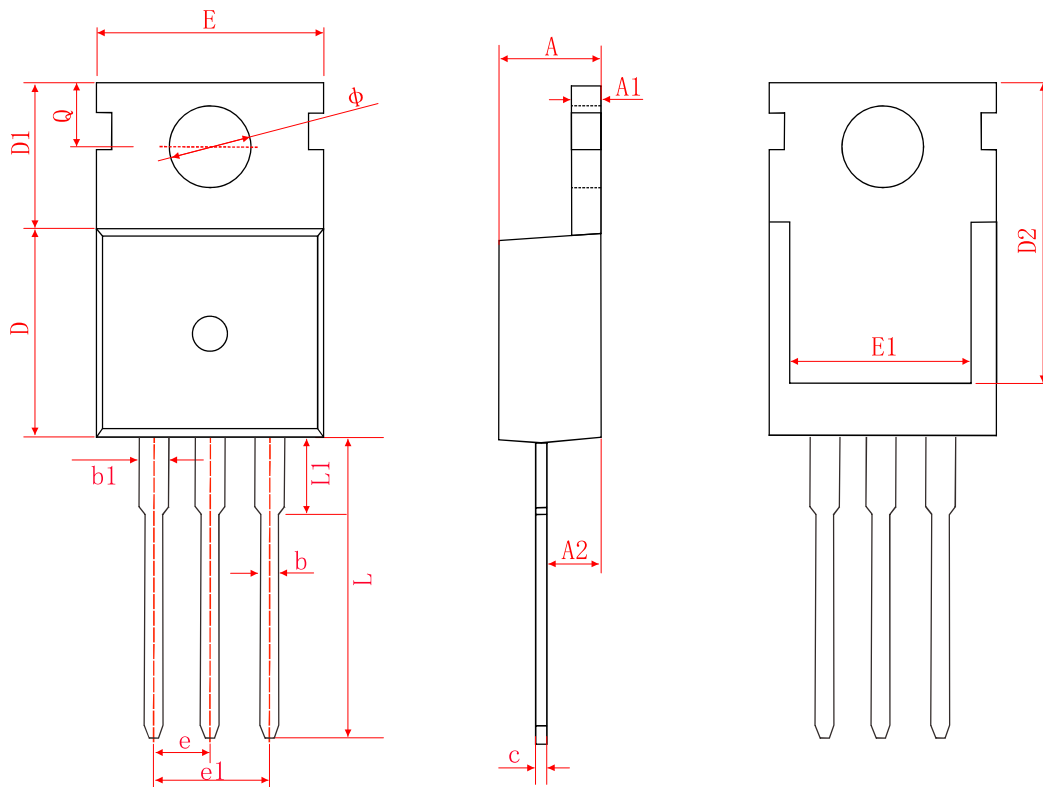
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



TO-220-3L-CB Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.40	4.60	0.173	0.181
A1	1.25	1.35	0.049	0.053
A2	2.30	2.50	0.091	0.098
b	0.75	0.85	0.030	0.033
b1	1.25	1.42	0.049	0.056
c	0.45	0.55	0.018	0.022
D	9.10	9.30	0.358	0.366
D1	6.40	6.60	0.252	0.260
D2	13.07	13.47	0.515	0.530
e	2.54 TYP		0.100 TYP	
e1	5.08 TYP		0.200 TYP	
E	9.80	10.15	0.386	0.400
E1	7.80	8.20	0.307	0.323
Q	2.70	2.90	0.106	0.114
L	13.00	13.45	0.512	0.530
L1	-	3.40		0.134
Φ	3.50	3.70	0.138	0.146