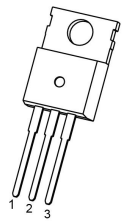
JIANGSU CHANGJING ELECTRONICS TECHNOLOGY CO., LTD.

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

CJP039SN25MK N-Channel Power MOSFET

TO-220-3L-CB



Key Performance Parameters

$V_{BR(DSS)}$	$R_{DS(on)}$TYP	I_D
250V	33mΩ@10V	55A

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

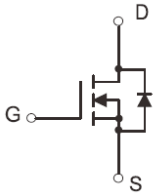
APPLICATIONS

- DC/DC
- Switching application

MARKING

XXXXXX = 039SN25MK
Solid dot = Green molding compound device.
YYYY = Code.

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	250	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C =25℃	I_D	55	A
	T_C =100℃		35	
Pulsed Drain Current		I_{DM}①②	220	A
Continuous Drain Current	T_A =25℃	I_D	4.6	A
	T_A =75℃		3.5	
Avalanche Current		I_{AS}③	17	A
Single Pulsed Avalanche Energy		E_{AS}③	72	mJ
Power Dissipation		P_D①	313	W
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-55~+150	℃

Thermal Characteristics

Parameter	Symbol	Value		Unit
		Typ	Max	
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.27	0.40	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$⑥	45	60	℃/W

ELECTRICAL CHARACTERISTICS (T_J=25℃ 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		250	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=250V, V_{GS}=0V	T_J=25℃	-	-	1.0	μA
			T_J=125℃	-	-	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-sate resistance	$R_{DS(on)}$④	V_{GS}=10V, I_D=20A	T_J=25℃	-	33	39	mΩ
			T_J=125℃	-	70	83	
Forward transconductance	g_{FS}	V_{DS}=5V, I_D=20A		-	60	-	S

Dynamic Characteristics⑤

Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=125V, f=1MHz	-	2631	-	pF
Output capacitance	C_{oss}		-	155	-	
Reverse transfer capacitance	C_{rss}		-	7	-	
Gate resistance	R_g	f=1MHz	-	4.6	-	Ω
Total gate charge	Q_g	V_{GS}=10V, V_{DS}=125V, I_D=20A	-	33.3	-	
Gate charge at threshold	$Q_{G(th)}$		-	7.5	-	
Gate-source charge	Q_{gs}		-	11	-	
Gate-drain charge	Q_{gd}		-	4.9	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=100V, V_{GS}=10V, I_D=20A, R_g=10Ω	-	25	-	ns
Turn-on rise time	t_r		-	22	-	
Turn-off delay time	$t_{d(off)}$		-	54	-	
Turn-off fall time	t_f		-	33	-	

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_S①		-	-	55	A
Pulsed drain-source diode forward current	I_{SM}①②		-	-	220	A
Reverse recovery time	t_{rr}	V_{DD}=100V, I_S=20A, di/dt=100A/μs	-	140	-	ns
Reverse recovery charge	Q_{rr}		-	750	-	nC

Notes:

①.T_C=25℃ Limited only by maximum temperature allowed.

②.P_W ≤10μs, Duty cycle ≤1%.

③.EAS condition: V_{DD}=125V, V_{GS}=10V, L=0.5mH, R_g=25Ω Starting T_J=25℃.

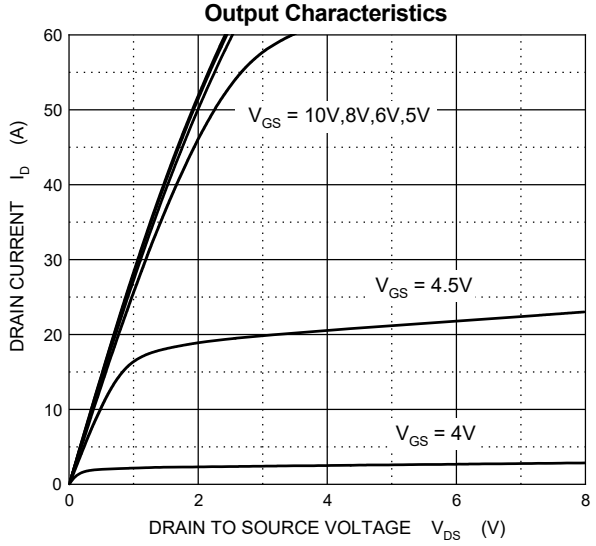
④.Pulse Test : Pulse Width ≤380μs, duty cycle ≤2%.

⑤.Guaranteed by design, not subject to production.

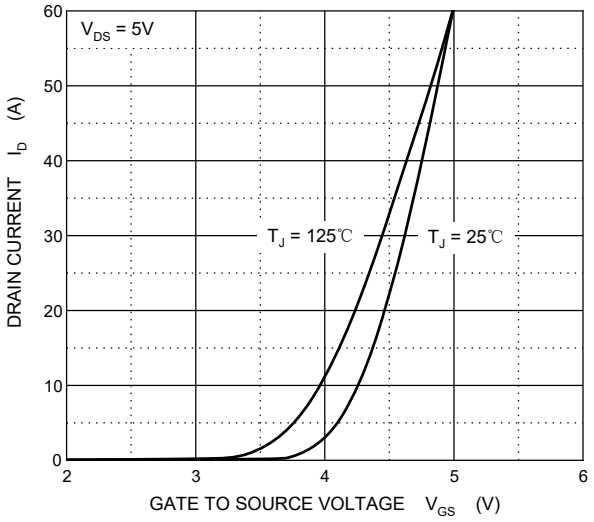
⑥.Device mounted in a still air environment with T_A=25℃.

Typical Characteristics

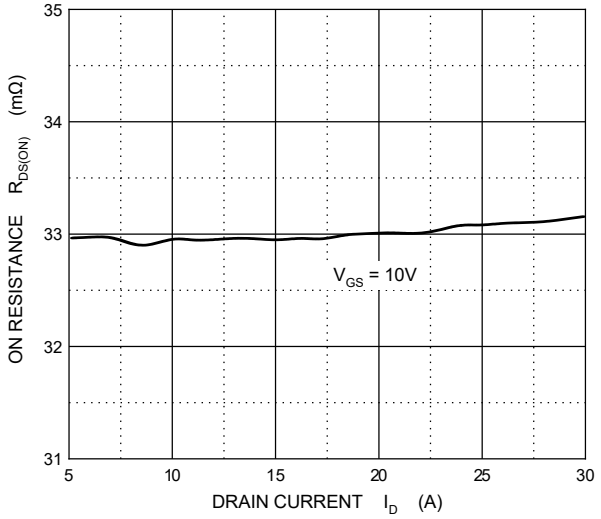
Output Characteristics



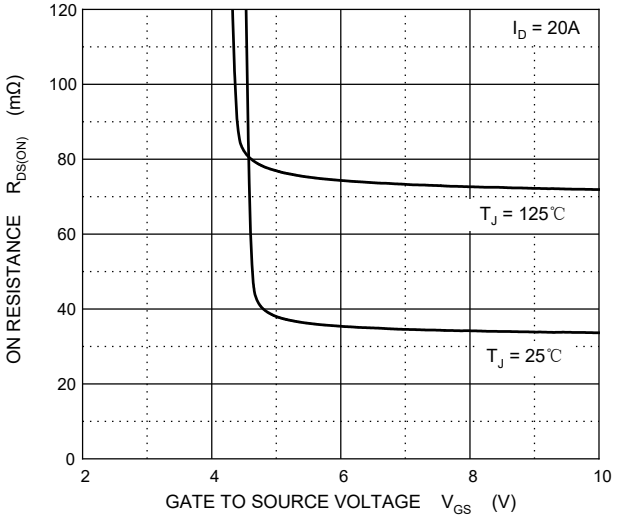
Transfer Characteristics



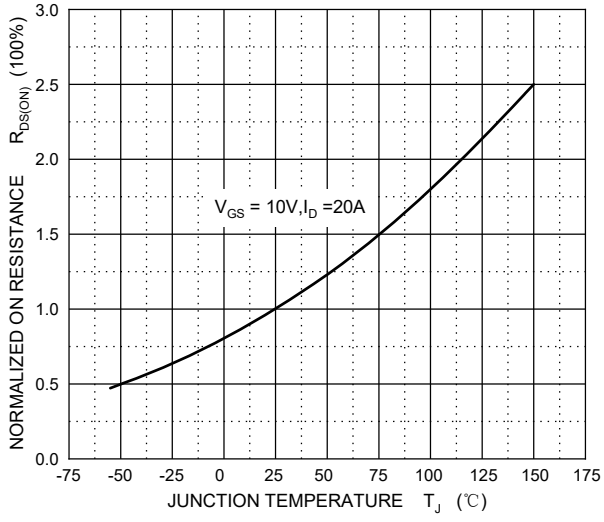
On Resistance vs. Drain Current



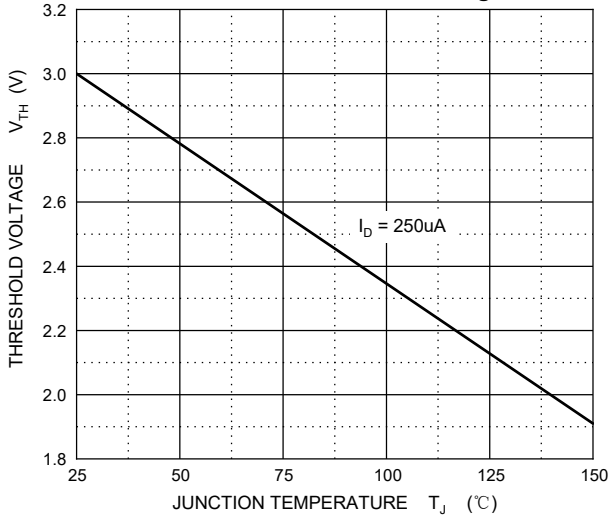
On Resistance vs. Gate-Source Bias



On Resistance vs. Junction Temperature

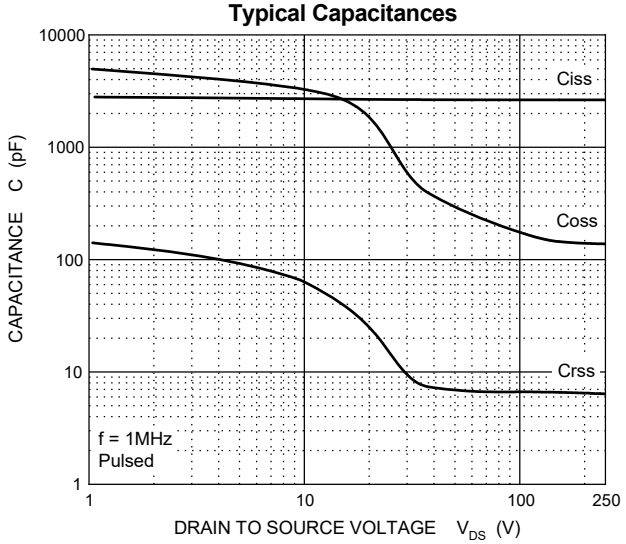


Gate-Source Threshold Voltage

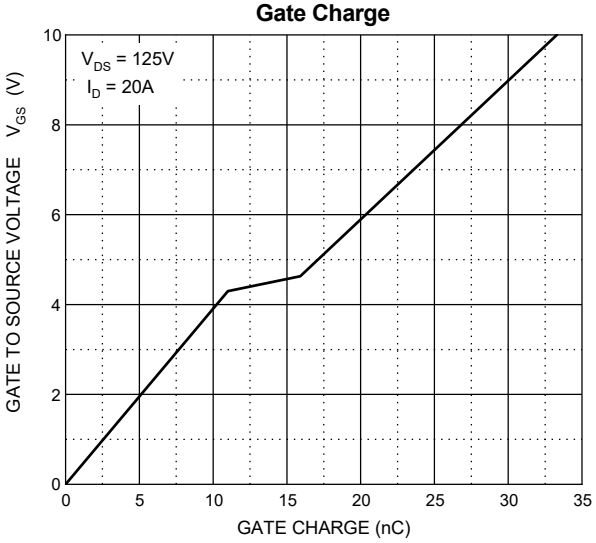


Typical Characteristics

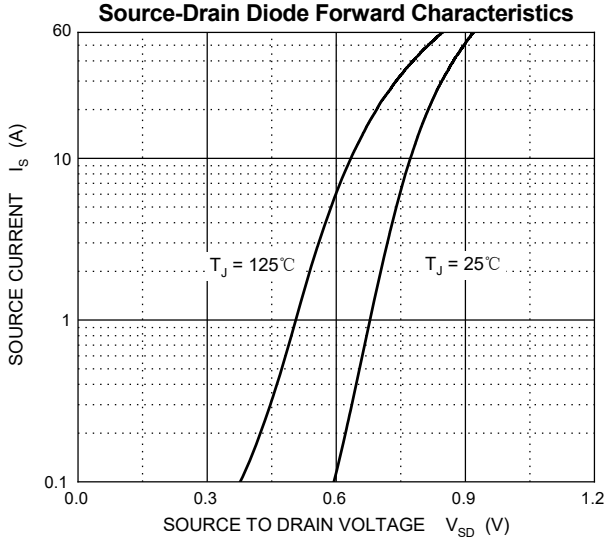
Typical Capacitances



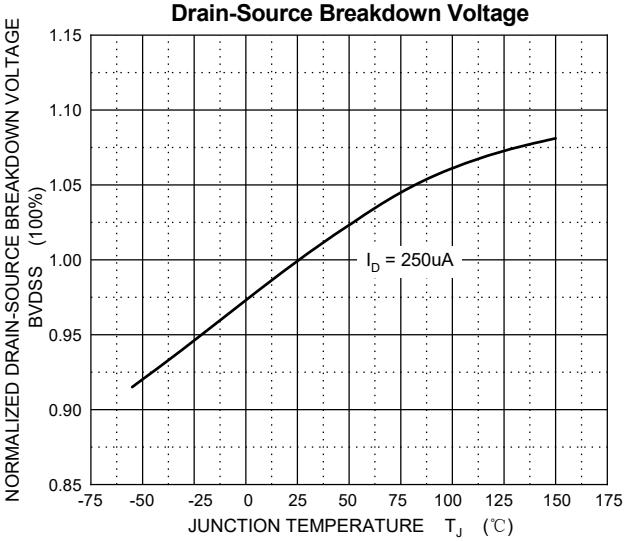
Gate Charge



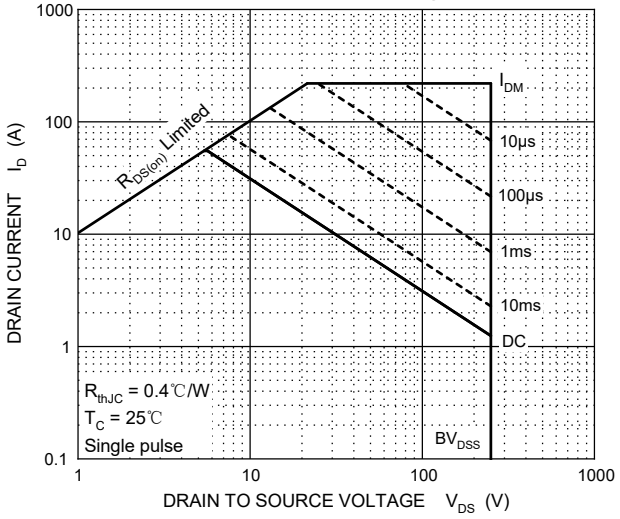
Source-Drain Diode Forward Characteristics



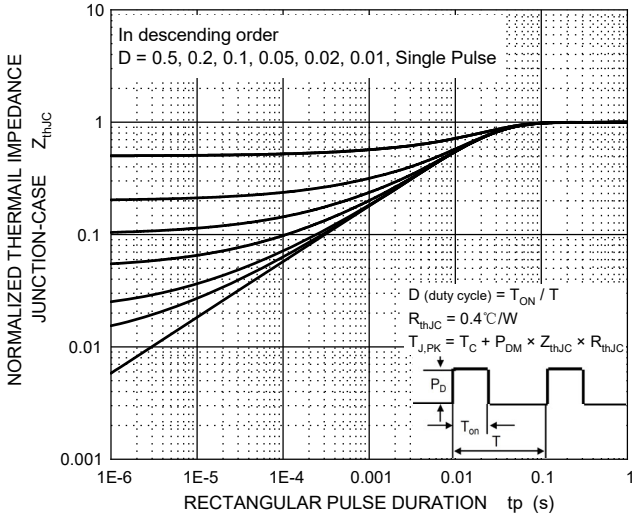
Drain-Source Breakdown Voltage



Maximum Safe Operating Area

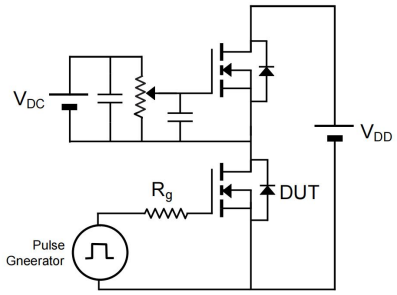


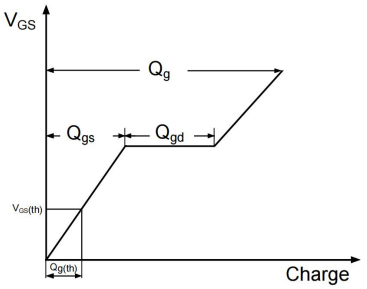
Transient Thermal Impedance, Junction-Case



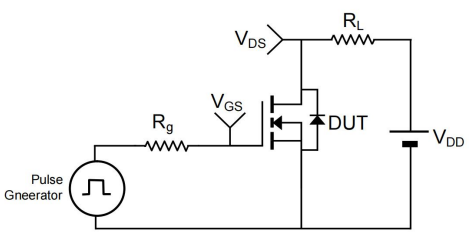
Test Circuit And Waveforms

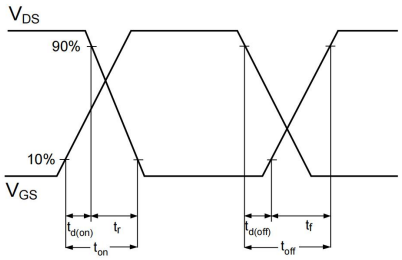
Gate Charge



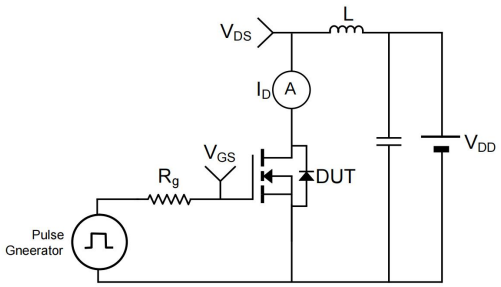


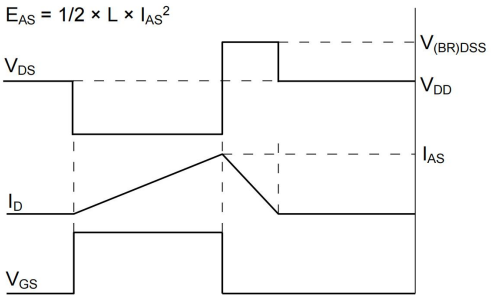
Resistive Load Switching Time



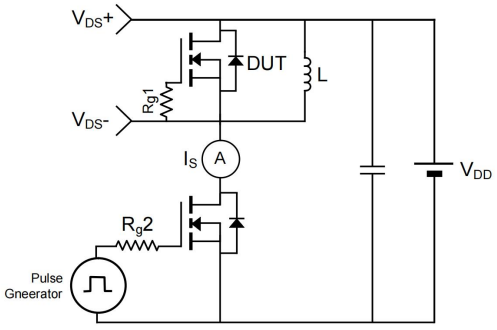


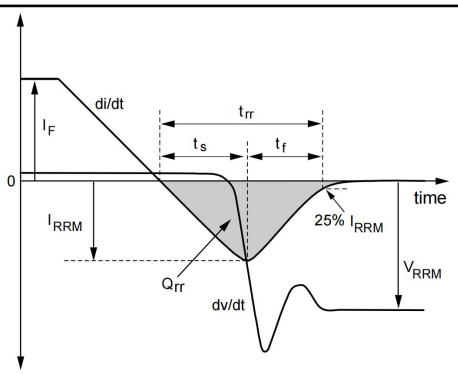
Un-clamped Inductive Load Switching



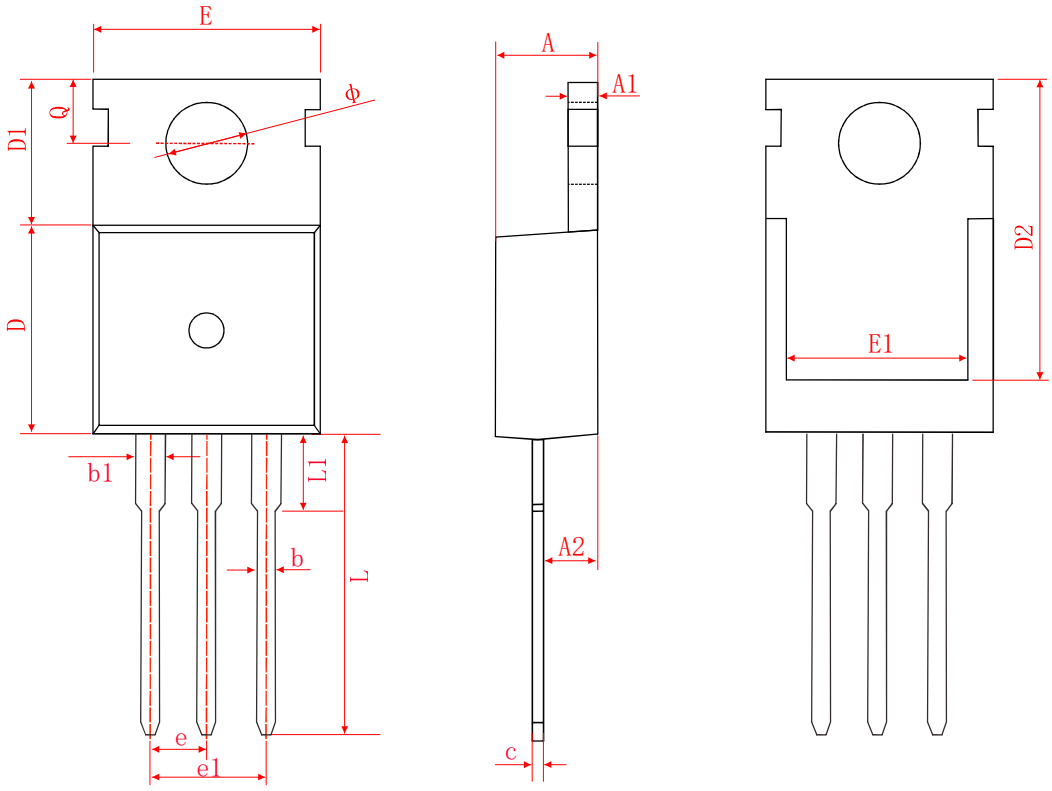


Drain-Source Body Diode Reverse Recovery





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