

### General Description

SJ-FET is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding. SJ-FET is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding. low on-resistance and lower gate charge performance. This advanced technology has been tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy SJ-FET is suitable for various AC/DC power conversion in switching mode operation for higher efficiency.

Product Summary			
V <sub>DS</sub>	R <sub>DS(on)</sub> (Ω) Typ	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ)
800V	0.22 @ 10V	20	70nc

### Features

- Low on-resistance
- Ultra low gate charge and input capacitance
- 100% avalanche tested
- Rohs compliant

### Mechanical Data

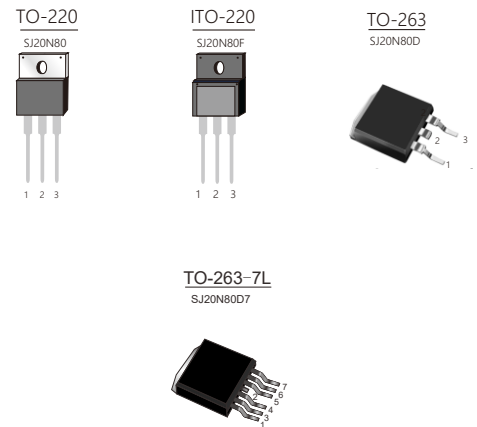
- Case: TO-220, ITO-220, TO-263, TO-263-7 Package

### Application

- Switching applications

### Ordering Information

Part No.	Package Type	Package	Quality(box)
SJ20N80	TO-220	Tube	1000
SJ20N80F	ITO-220	Tube	1000
SJ20N80D	TO-263	Tape & Reel	800
SJ20N80D7	TO-263-7	Tape & Reel	2500



### Block Diagram

Pin Definition:  
 1. Gate  
 2. Drain  
 3/4/5/6/7. Source

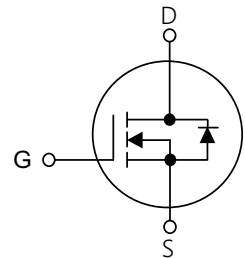


Table1 Absolute Maximum Ratings (T<sub>C</sub>=25°C, unless otherwise specified)

Parameter	Symbol	TO-220/TO-263/TO-263-7	ITO-220	Unit
Drain-Source Voltage	V <sub>DS</sub>	800		V
Gate-Source Voltage	V <sub>GS</sub>	±30		V
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> =25°C	20	A
		T <sub>C</sub> =100°C	10	
Pulsed Drain Current (Note 1)	I <sub>DM</sub>	62		A
Single Pulse Avalanche Energy(Note 2)	E <sub>AS</sub>	485		mJ
Avalanche Current(Note 1)	I <sub>AR</sub>	4		A
Repetitive Avalanche Energy(Note 1)	E <sub>AR</sub>	1		mJ
Reverse Diode Recovery dv/dt(Note 3)	dv/dt	4.5		V/ns
Power Dissipation T <sub>C</sub> =25°C	P <sub>D</sub>	205	35	W
Operating Junction and Storage Temperature	T <sub>J</sub> /T <sub>STG</sub>	-55 ~ +150		°C

Table 2. Thermal Characteristics

Parameter	Symbol	TO-220/TO-263 TO-263-7	ITO-220	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62	80	$^{\circ}\text{C}/\text{W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	0.6	3.6	$^{\circ}\text{C}/\text{W}$

Table 3. Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu\text{A}$	800			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=800V, V_{GS}=0V$			1	$\mu\text{A}$
Gate- Source Leakage Current	Forward	$V_{GS}=30V, V_{DS}=0V$			100	nA
	Reverse	$V_{GS}=-30V, V_{DS}=0V$			-100	nA
On Characteristics(Note 4)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.0A$		0.22	0.24	$\Omega$
Dynamic Characteristics(Note 5)						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$		1440		pF
Output Capacitance	$C_{OSS}$			300		pF
Reverse Transfer Capacitance	$C_{RSS}$			10		pF
Switching Characteristics (Note 5)						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=400V, I_D=5.0A,$ $R_G=20\Omega$		25		ns
Turn-On Rise Time	$t_R$			55		ns
Turn-Off Delay Time	$t_{d(off)}$			70		ns
Turn-Off Fall Time	$t_f$			40		ns
Total Gate Charge	$Q_G$	$V_{DS}=480V, I_D=10A,$ $V_{GS}=10V$		70	90	nC
Gate-Source Charge	$Q_{GS}$			7.8		nC
Gate-Drain Charge	$Q_{GD}$			9		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=10A$		1.0	1.5	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				20	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				60	A
Reverse Recovery Time	$t_{rr}$	$V_R=400V, I_S=10A$		475		ns
Reverse Recovery Charge	$Q_{RR}$	$di/dt=100A/\mu\text{s}$ (Note 1)		5.8		$\mu\text{C}$

Notes : 1 Repetitive Rating: Pulse width limited by maximum junction temperature

2  $L=79\text{mH}, I_{AS}=3.5A, V_{DD}=50V$ , Starting  $T_J=25^{\circ}\text{C}$

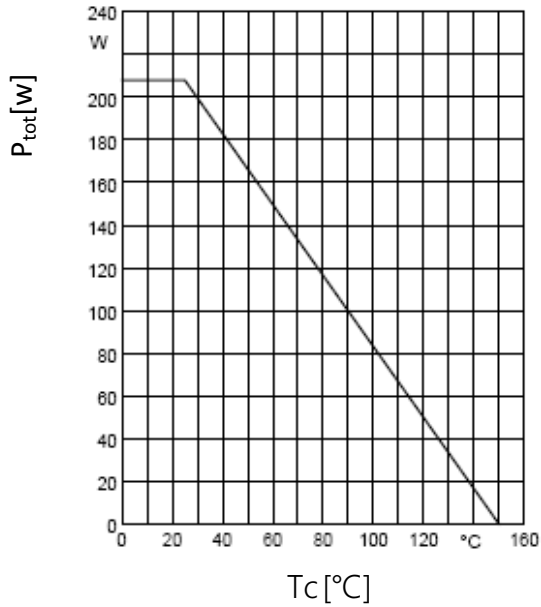
3  $I_{SD}\leq I_D, di/dt\leq 200A/\mu\text{s}, V_{DD}\leq BV_{DSS}$ , starting  $T_J=25^{\circ}\text{C}$

4 Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

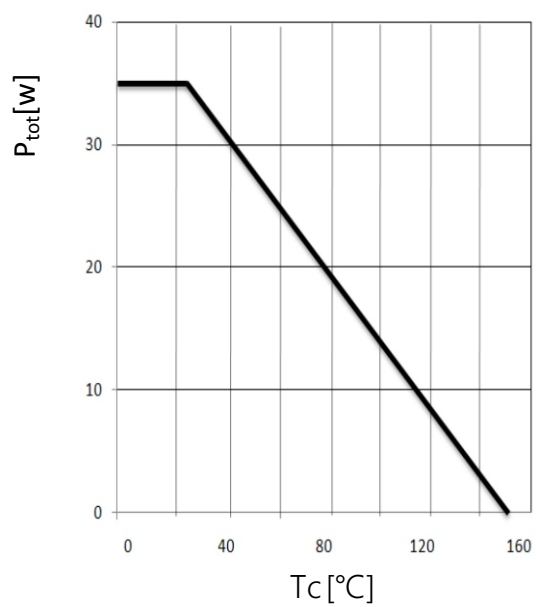
5 Guaranteed by design, not subject to production

Typical Characteristics Diagrams

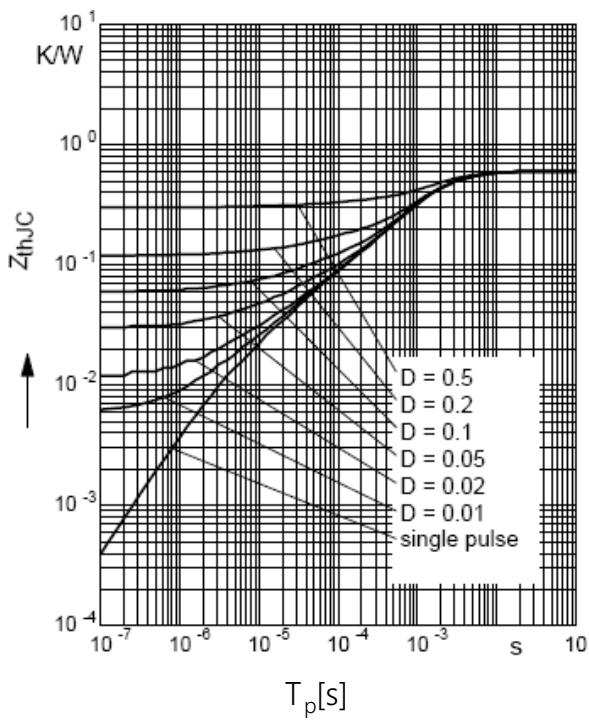
Power dissipation  
TO-220



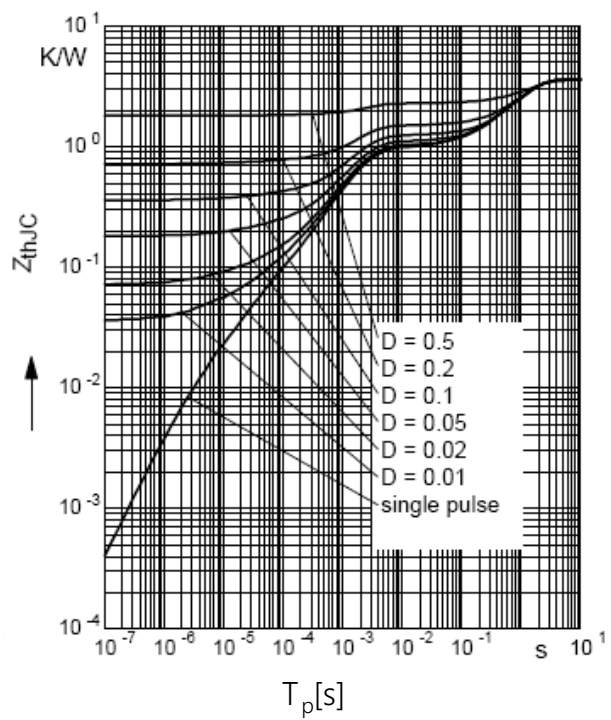
Power dissipation  
ITO-220



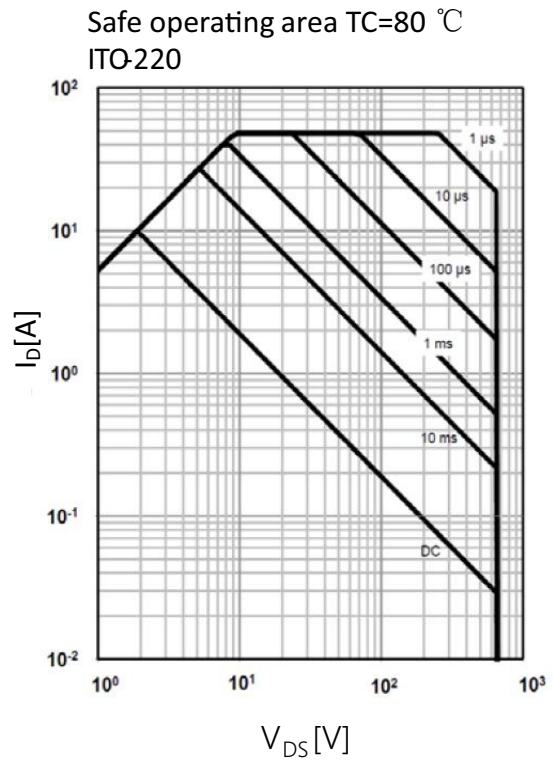
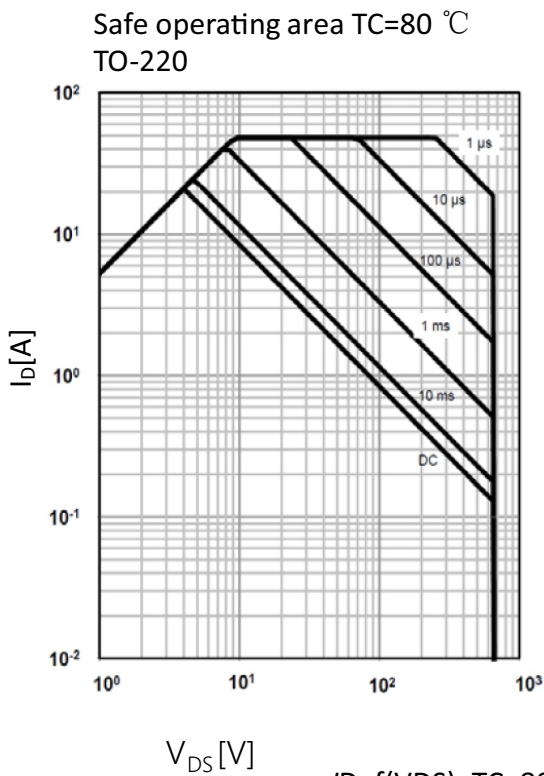
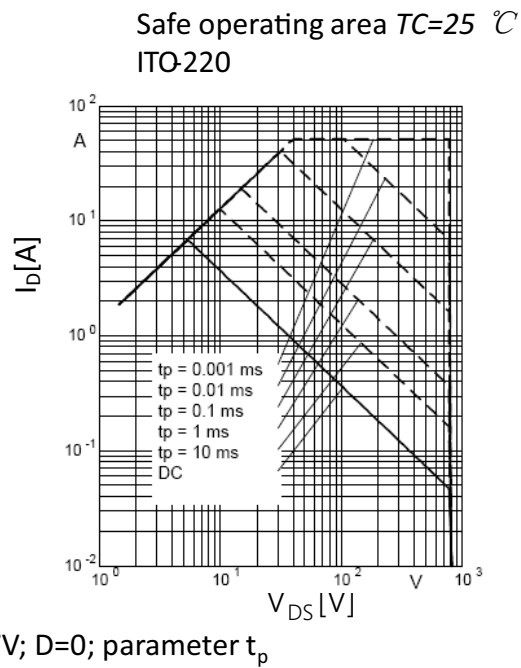
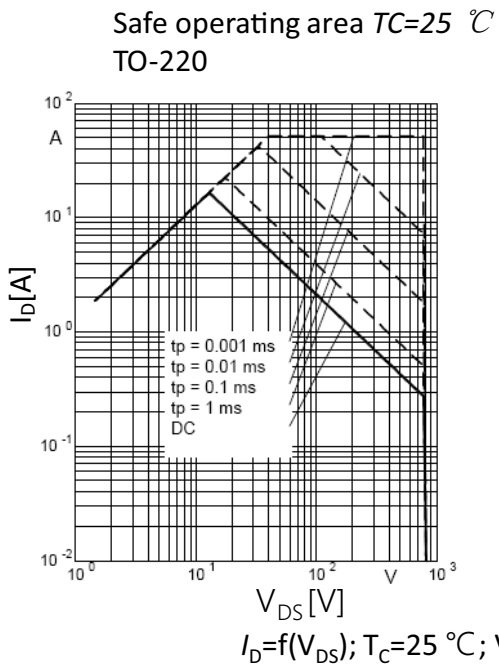
Max. transient thermal impedance  
TO-220



Max. transient thermal impedance  
ITO-220

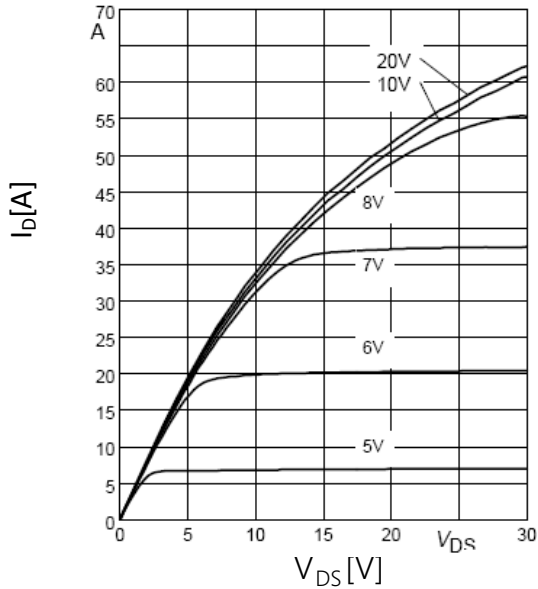


Typical Characteristics Diagrams



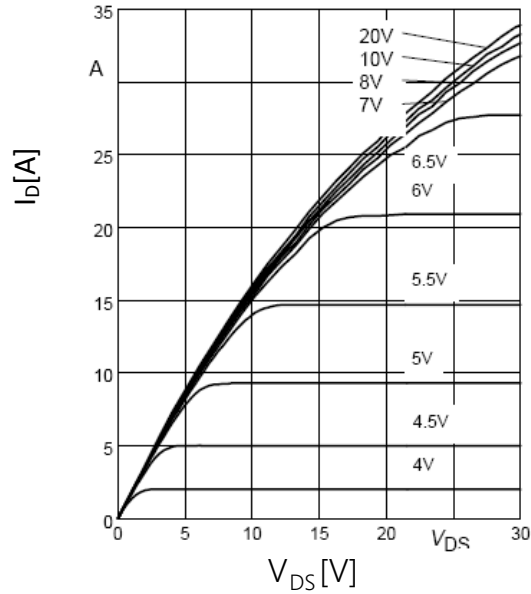
Typical Characteristics Diagrams

Typ. output characteristics  
 $T_j=25\text{ }^\circ\text{C}$



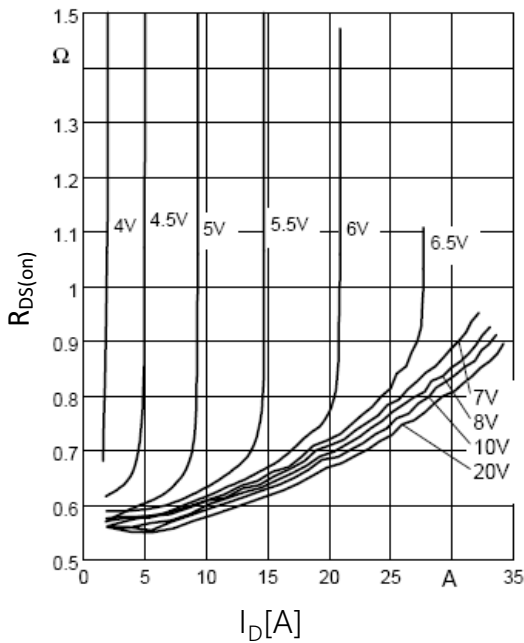
$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C}$  ; parameter:  $V_{GS}$

Typ. output characteristics  
 $T_j=150\text{ }^\circ\text{C}$



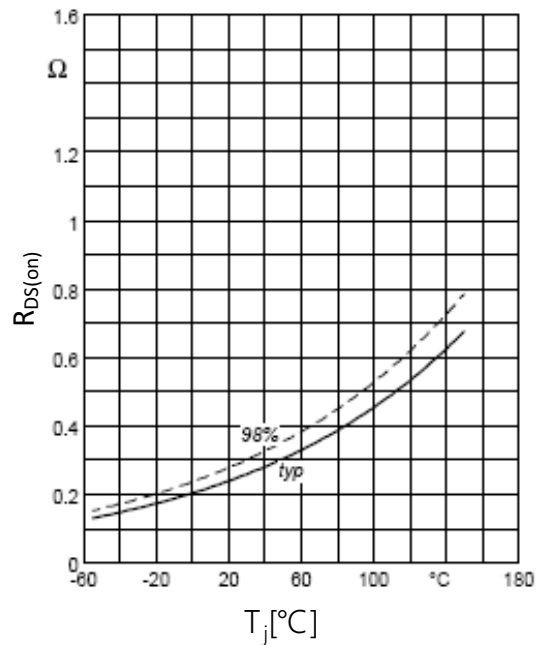
$I_D=f(V_{DS}); T_j=150\text{ }^\circ\text{C}$  ; parameter:  $V_{GS}$

Typ. drain-source on-state resistance



$R_{DS(on)}=f(I_D); T_j=150\text{ }^\circ\text{C}$  ; parameter:  $V_{GS}$

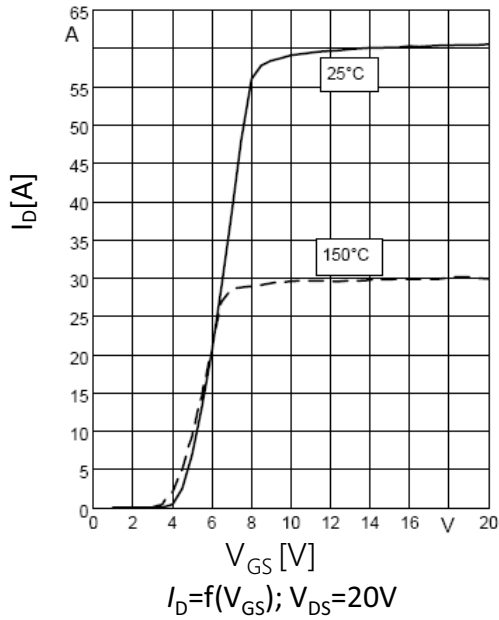
Typ. drain-source on-state resistance



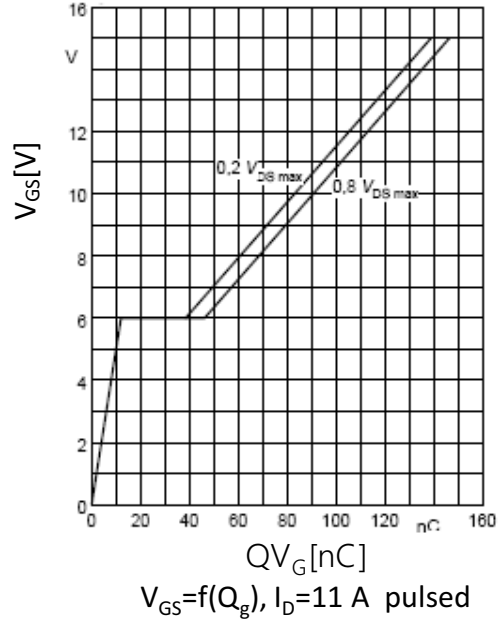
$R_{DS(on)}=f(T_j); I_D=11\text{ A}; V_{GS}=10\text{ V}$

Typical Characteristics Diagrams

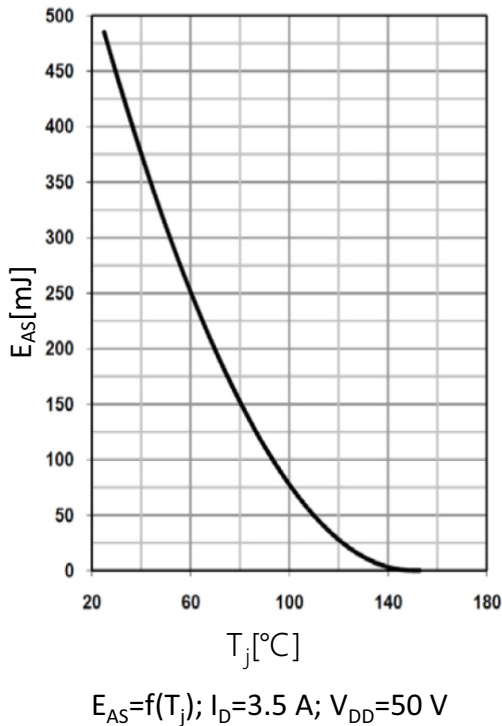
Typ. transfer characteristics



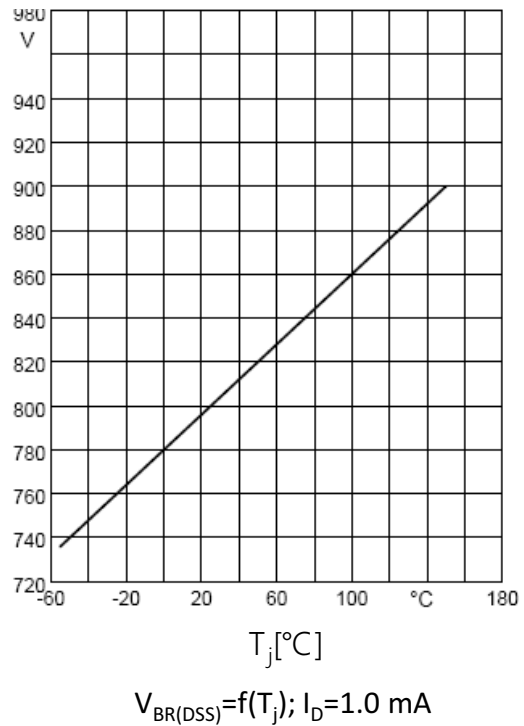
Typ. gate charge



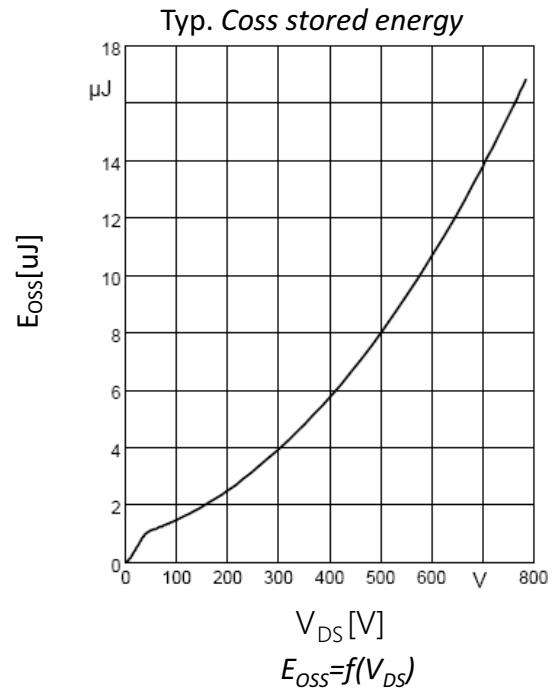
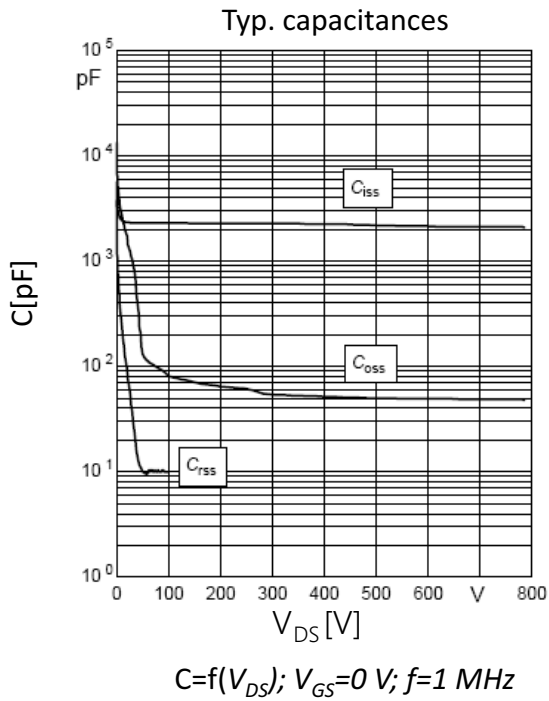
Avalanche energy



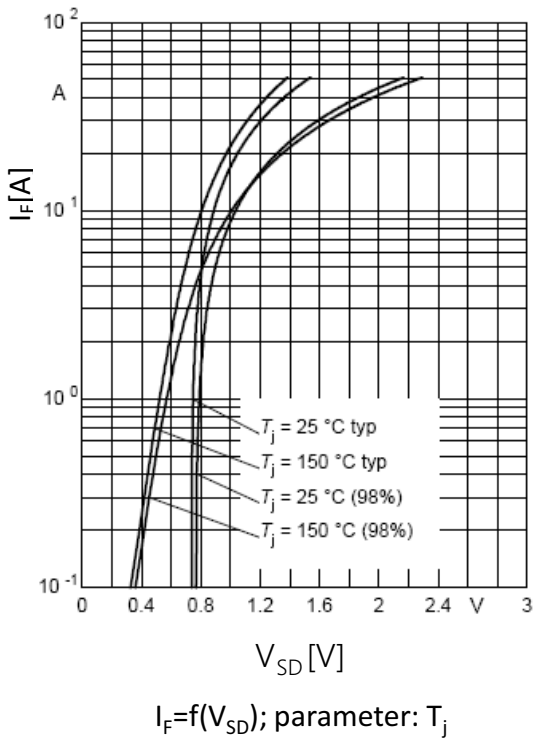
Drain-source breakdown voltage



Typical Characteristics Diagrams

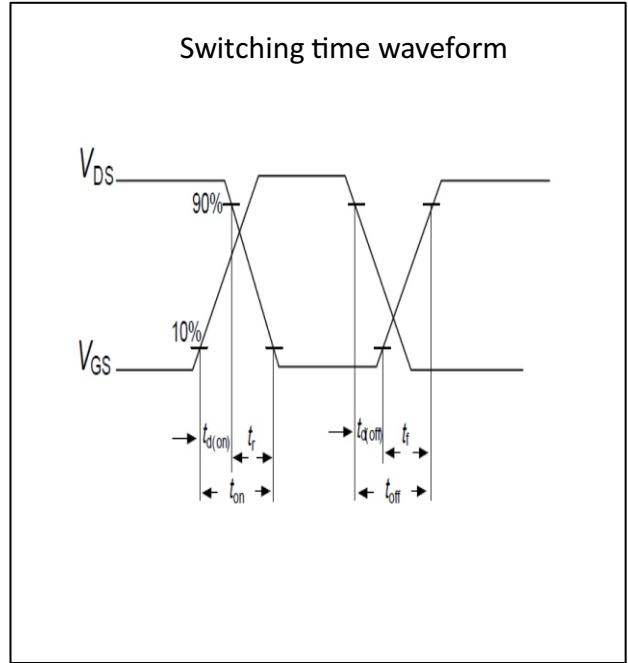
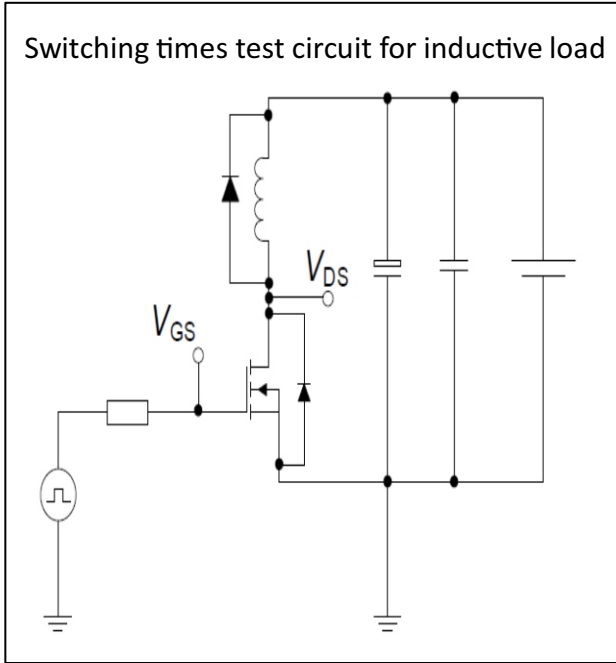


Forward characteristics of reverse diode

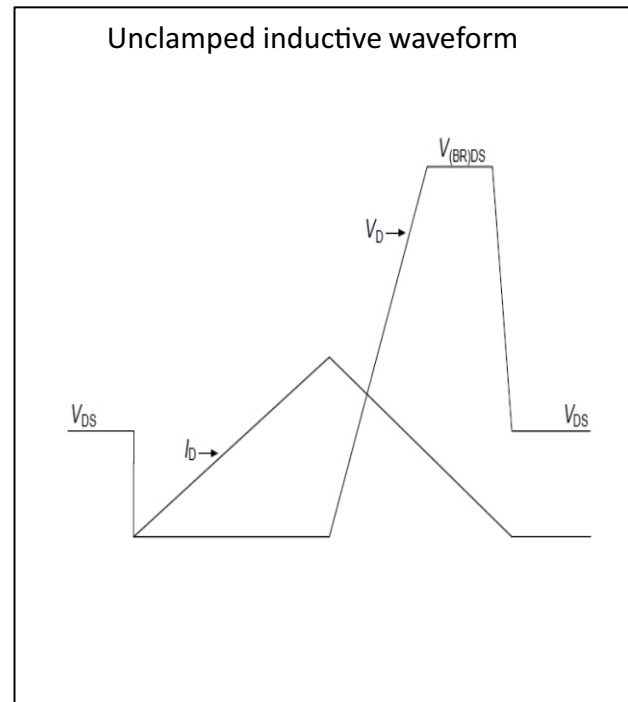
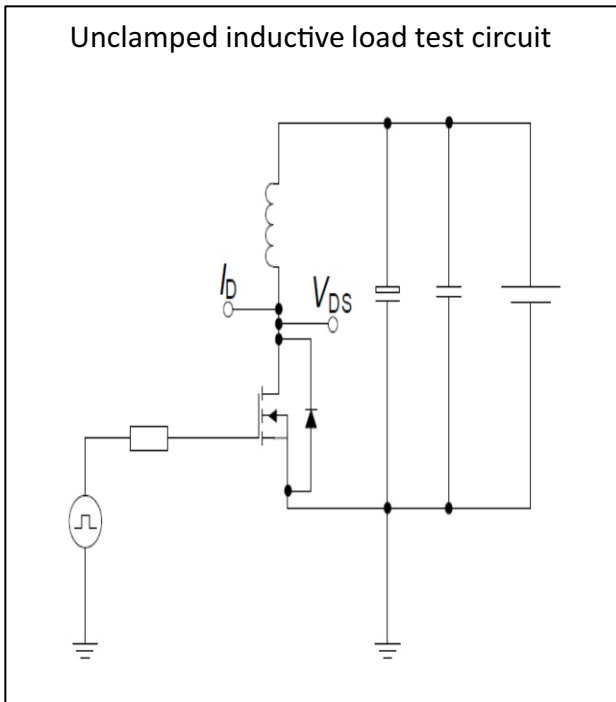


Typical Test Circuit

Switching times test circuit and waveform for inductive load



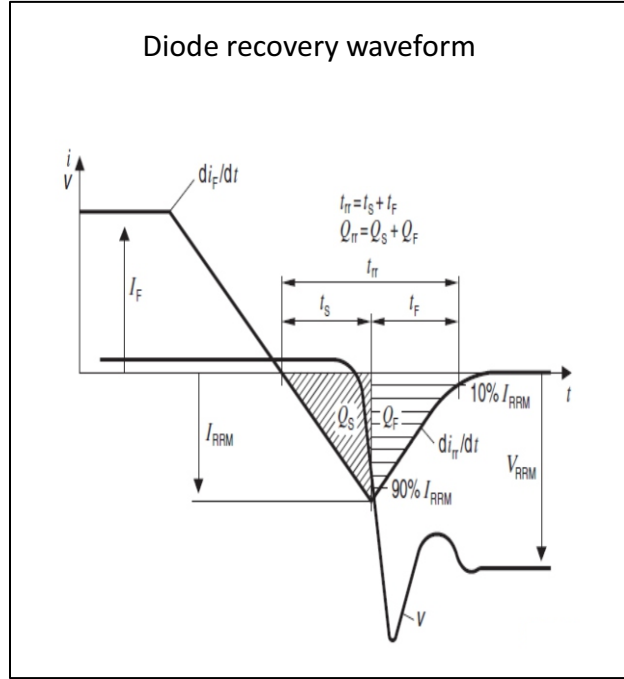
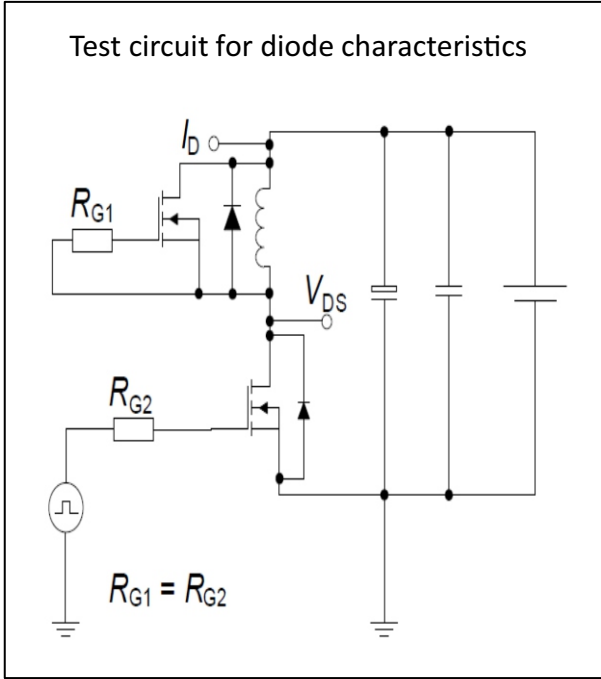
Unclamped inductive load test circuit and waveform



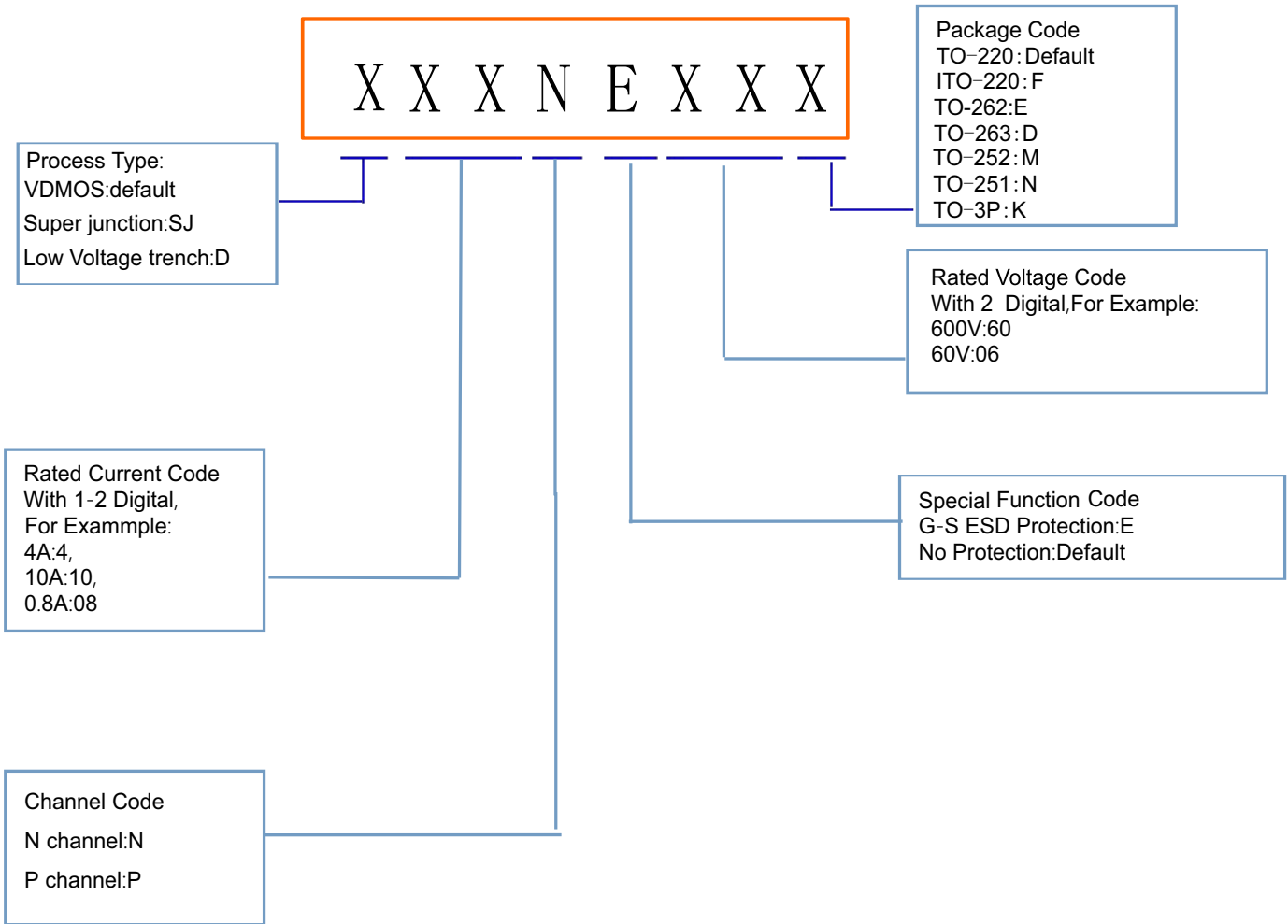


Typical Test Circuit

Test circuit and waveform for diode characteristics

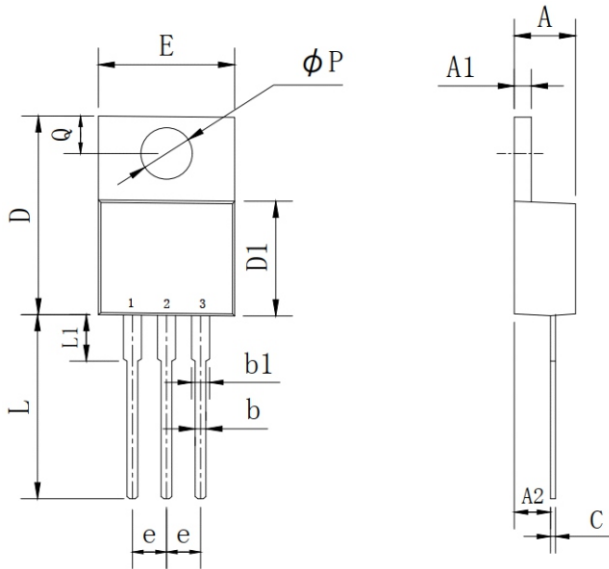


Product Names Rules



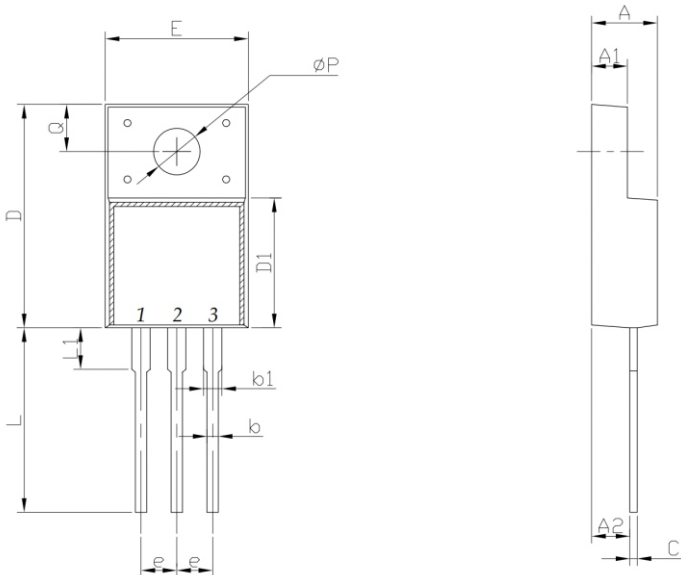
Dimensions

TO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	2.03	2.92	0.080	0.115
b	0.51	1.11	0.020	0.044
b1	0.97	1.6	0.038	0.063
C	0.3	0.7	0.012	0.028
D	14.6	15.9	0.575	0.626
D1	8.04	9.3	0.317	0.366
E	9.57	10.57	0.377	0.416
e	2.34	2.74	0.092	0.108
L	12.58	14.3	0.495	0.563
L1	2.8	4.2	0.110	0.165
P	3.4	4.14	0.134	0.163
Q	2.45	3	0.096	0.118

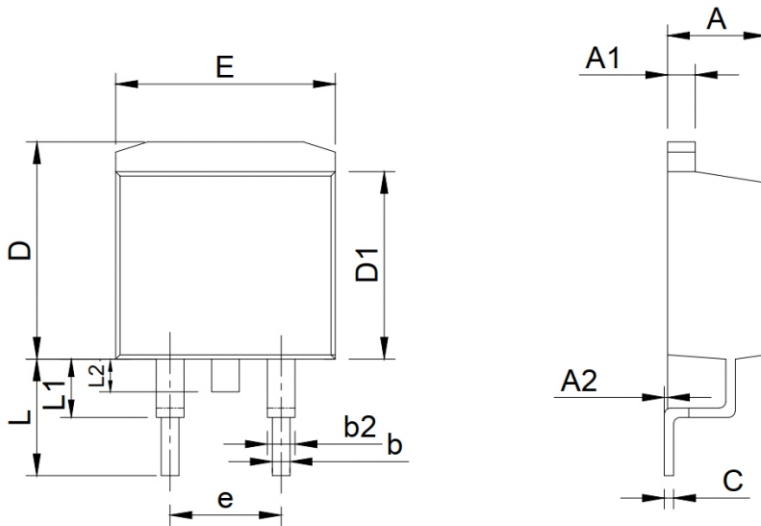
ITO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
L	12.6	14	0.496	0.551
L1	2.45	4.3	0.096	0.169
P	2.9	3.8	0.114	0.150
Q	2.5	3.55	0.098	0.140

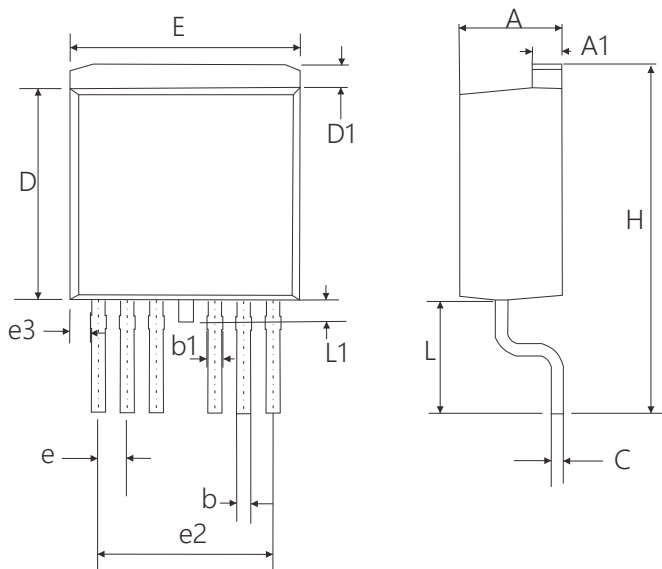
Dimensions

TO-263 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192	0.208
L	4.46	5.85	0.176	0.230
L1	1.33	2.33	0.052	0.092
L2	0	2.2	0.000	0.087

TO-263-7L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.75	0.167	0.187
A1	1.2	1.4	0.047	0.055
b	0.5	0.7	0.020	0.028
b1	0.5	0.9	0.020	0.035
C	0.4	0.6	0.016	0.024
D	9.05	9.45	0.356	0.372
D1	0.7	1.3	0.028	0.051
E	9.8	10.2	0.386	0.402
e	1.07	1.47	0.042	0.058
e2	7.32	7.92	0.288	0.312
e3	0.64	1.04	0.025	0.041
H	14.65	15.65	0.577	0.616
L	4.47	5.47	0.176	0.215
L1	0.90	1.50	0.035	0.059

## Friendship Reminder

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