

General Description

This series of power MOSFET use N channel Multi-EPI Super-Junction technology and design to provide better characteristics, such as fast switching time, low Ciss and Crss, low on resistance and excellent avalanche characteristics, making it especially suitable for applications which require superior power density and outstanding efficiency.

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-262, TO-251, TO-252, TO-263-7L Package

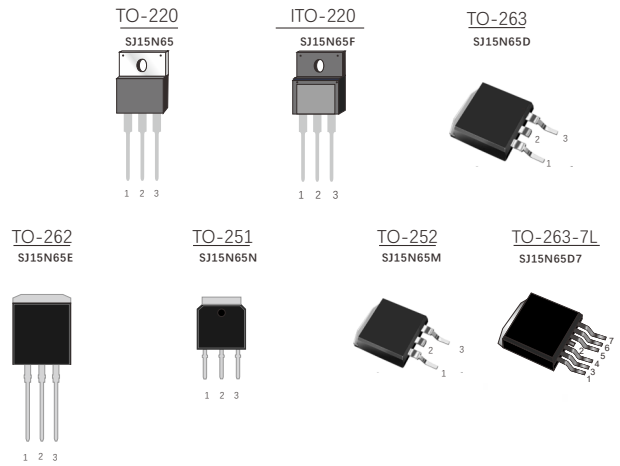
Application

- Switching applications

Ordering Information

Part No.	Package Type	Package	Quality(box)
SJ15N65	TO-220	Tube	1000
SJ15N65F	ITO-220	Tube	1000
SJ15N65D	TO-263	Tape & Reel	800
SJ15N65E	TO-262	Tube	1000
SJ15N65N	TO-251	Tube	1000
SJ15N65M	TO-252	Tape & Reel	3000
SJ15N65D7	TO-263-7L	Tape & Reel	800

Product Summary			
V _{DS}	R _{DS(on)} (Ω)Typ	I _D (A)	Q _g (Typ)
650V	0.25 @ 10V, 7.5A	15	34nc



Block Diagram

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

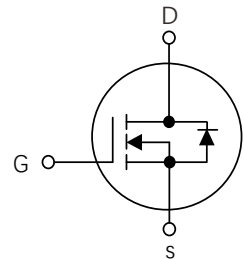


Table1 Absolute Maximum Ratings (Tc=25°C, unless otherwise specified)

Parameters	Symbol	SJ15N65	SJ15N65M	SJ15N65F	Unit
		SJ15N65D	SJ15N65N		
Drain-Source Voltage	V _{DS}	650			V
Gate-Source Voltage	V _{GS}	±30			V
Contionous Drain Current	I _D	15			A
		12			
Pulsed Drain Current (Note 1)	I _{DM}	60			A
Single Pulse Avalanche Energy(Note 2)	EAS	280			mJ
Avalanche Current(Note 1)	I _{AR}	2.8			A
Repetitive Avalanche Energy(Note 1)	EAR	1.4			mJ
Reverse Diode Recovery dv/dt(Note 3)	dv/dt	15			V/ns
Drain Source Voltage Slope (V _{DS} =720V)	dv/dt	50			V/ns
Power Dissipation Tc=25°C	P _D	151		35	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +150			°C

Table 2. Thermal Characteristics

Parameters	Symbol	SJ15N65	SJ15N65M	SJ15N65F	Unit	
		SJ15N65D	SJ15N65N			SJ15N65E
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62			82	$^{\circ}\text{C}/\text{W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	1.2			4.1	$^{\circ}\text{C}/\text{W}$

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

Parameters		Symbol	Test Conditions	Min	Typ	Max	Unit	
Off Characteristics								
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS}=0V, I_D=250\mu\text{A}$	650			V	
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			1	μA	
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS}=30V, V_{DS}=0V$			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		$R_{DS(ON)}$	$V_{GS}=10V, I_D=7.5\text{A}$		0.25	0.28	Ω	
Dynamic Characteristics(Note 5)								
Input Capacitance		C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$		1050		pF	
Output Capacitance		C_{OSS}				37		pF
Reverse Transfer Capacitance		C_{RSS}				2.5		pF
Switching Characteristics (Note 5)								
Turn-On Delay Time		$t_{d(on)}$	$V_{DD}=400V, I_D=7.5\text{A},$ $V_{GS}=10V, R_G=20\Omega$		17		ns	
Turn-On Rise Time		t_r				12		ns
Turn-Off Delay Time		$t_{d(off)}$				85		ns
Turn-Off Fall Time		t_f				10		ns
Total Gate Charge		Q_G	$V_{DS}=400V, I_D=6.5\text{A},$ $V_{GS}=10V$		34		nC	
Gate-Source Charge		Q_{GS}				4.5		nC
Gate-Drain Charge		Q_{GD}				19		nC
Drain-Source Diode Characteristics and Maximum Ratings								
Drain-Source Diode Forward Voltage		V_{SD}	$V_{GS}=0V, I_S=7.5\text{A}$		0.9	1.5	V	
Maximum Continuous Drain-Source Diode Forward Current(Note 4)		I_S				15	A	
Reverse Recovery Time		t_{rr}	$V_R=400V, I_S=7.5\text{A}$		300		ns	
Reverse Recovery Charge		Q_{RR}	$di/dt=100\text{A}/\mu\text{s}$ (Note 4)		3.5		μC	

Notes: 1 Repetitive Rating: Pulse width limited by maximum junction temperature
 2 $L=60\text{mH}, I_{AS}=3\text{A}, V_{DD}=150\text{V}$, Starting $T_J=25^{\circ}\text{C}$
 3 $I_{SD}\leq 4.5\text{A}, di/dt\leq 200\text{A}/\mu\text{s}, V_{DD}\leq BV_{DSS}$, 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

Figure 1. Output Characteristics

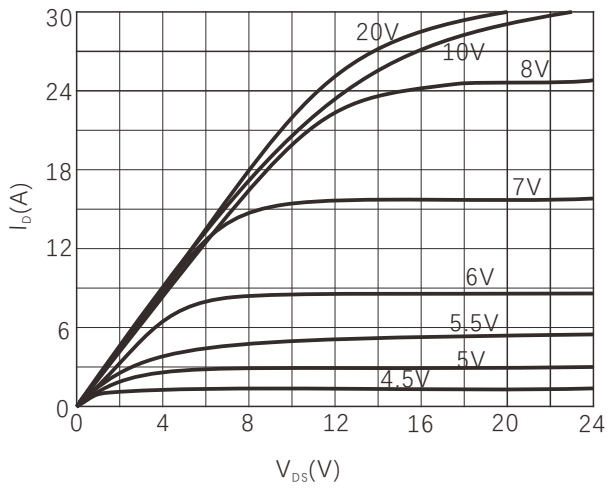


Figure 2. Transfer Characteristics

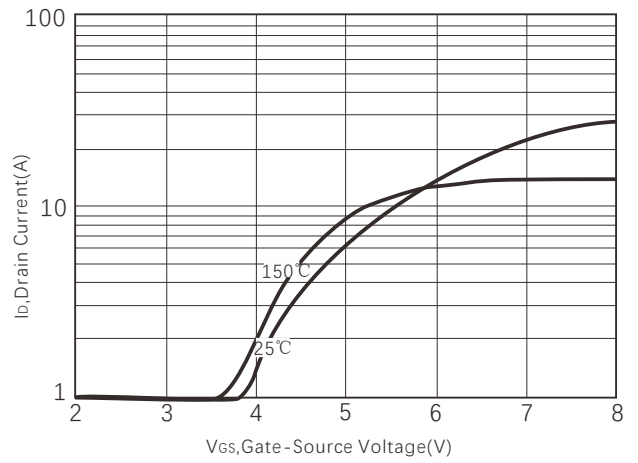


Figure 3. On-Resistance vs. Drain Current

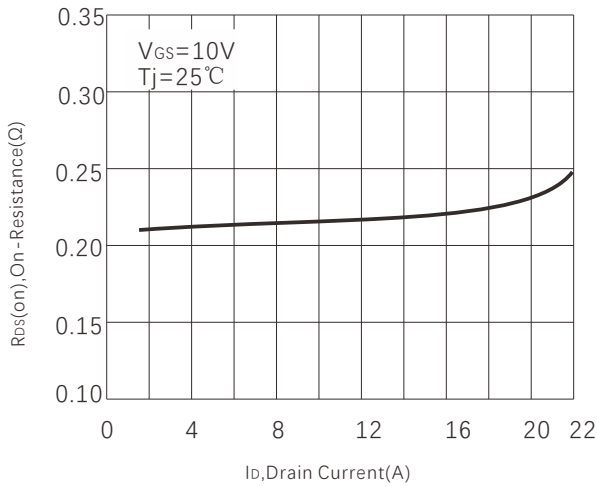


Figure 4. Capacitance

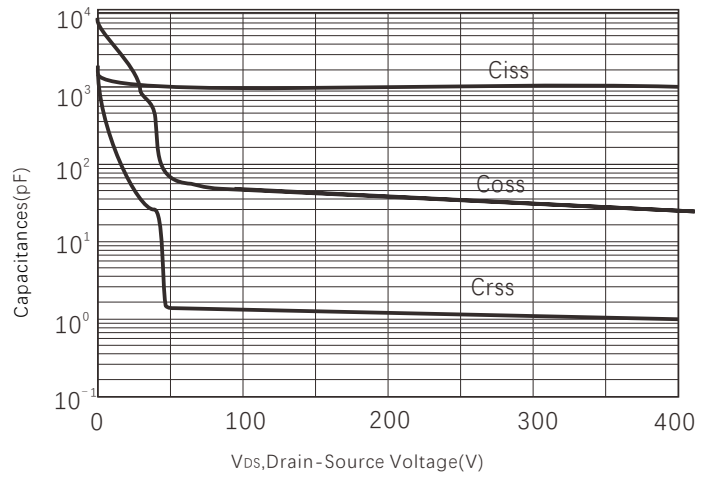


Figure 5. Gate charge

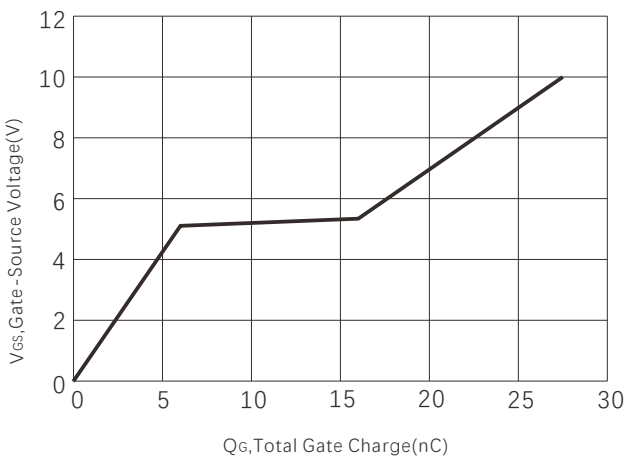


Figure 6. Source-Drain Diode Forward Voltage

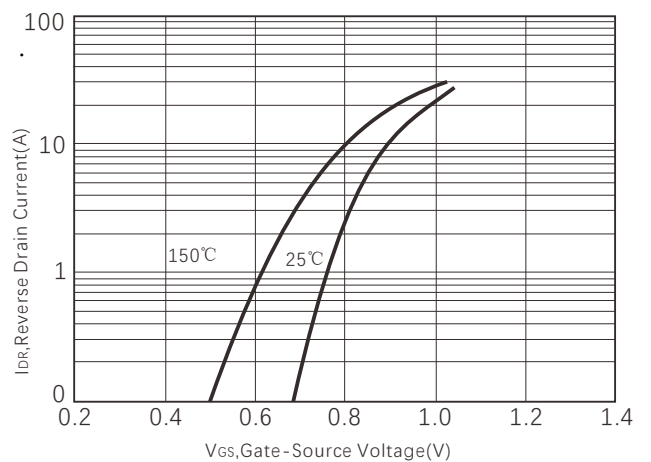


Figure 7. Normalized $R_{DS(ON)}$ vs Junction Temperature

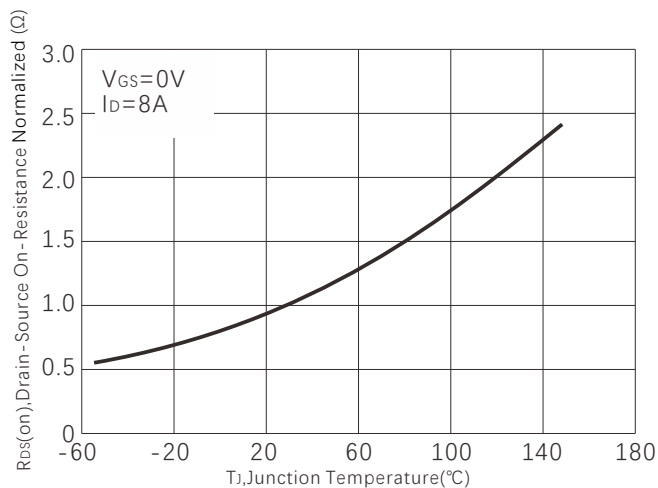


Figure 8. BV_{DSS} vs Junction Temperature

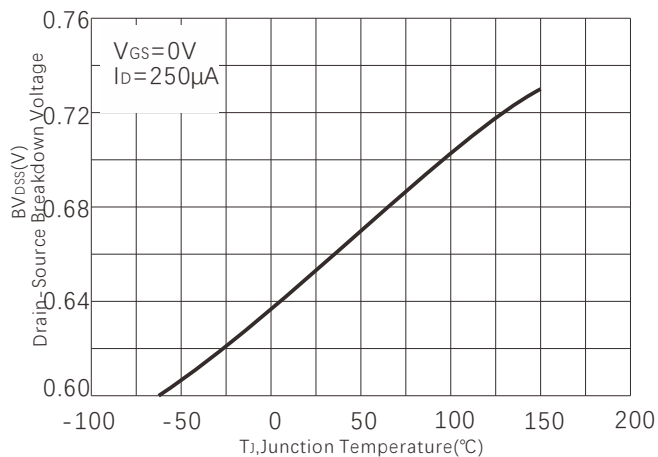


Figure 9. Safe operating area -Non ITO-220

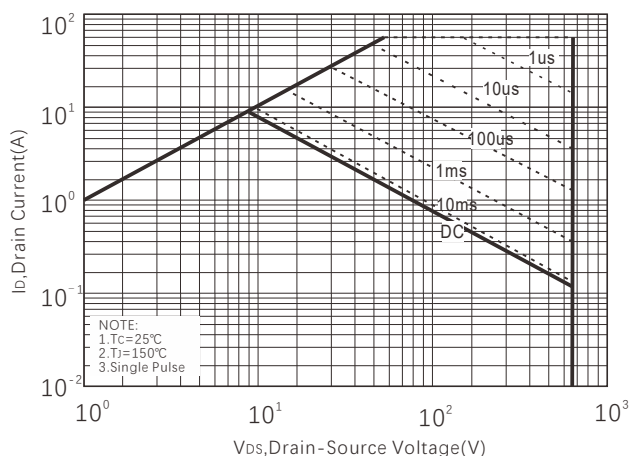


Figure 10. Safe operating area for ITO-220

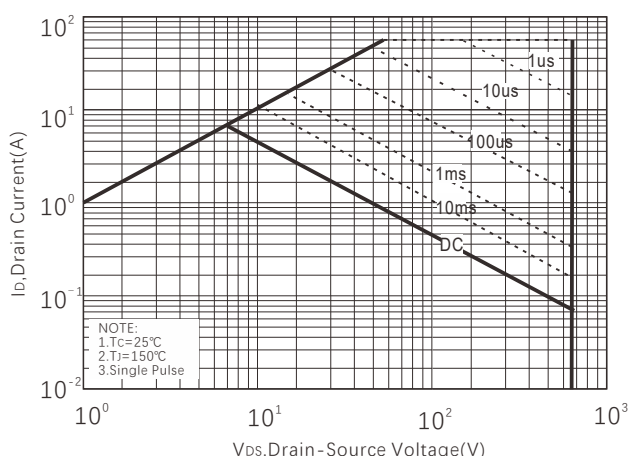


Figure 11. Maximum Transient Thermal Impedance -Non ITO-220

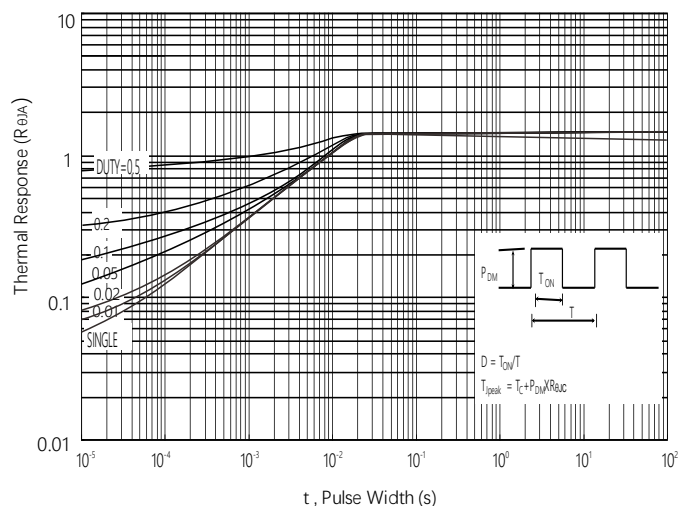
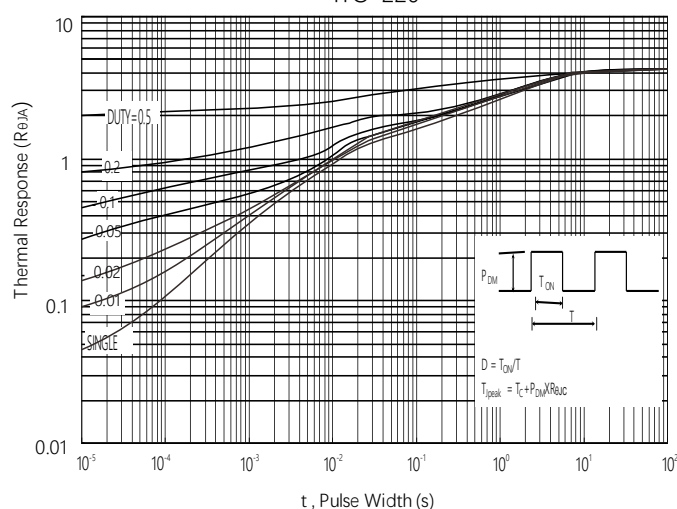
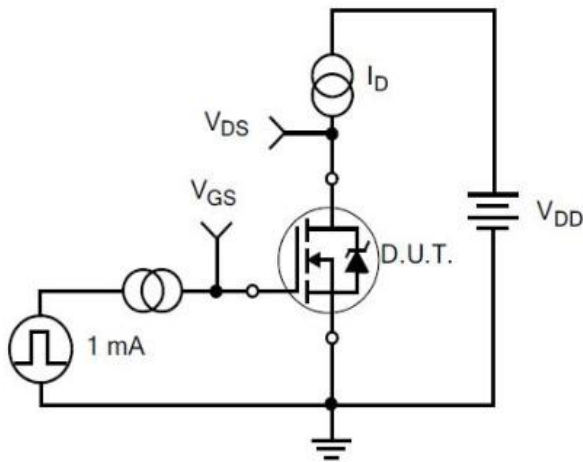


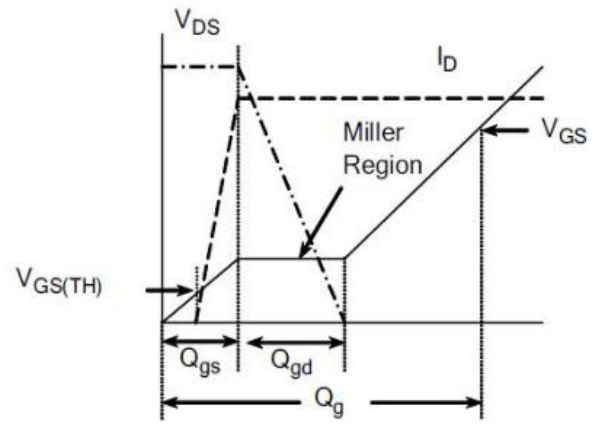
Figure 12. Maximum Transient Thermal Impedance - ITO-220



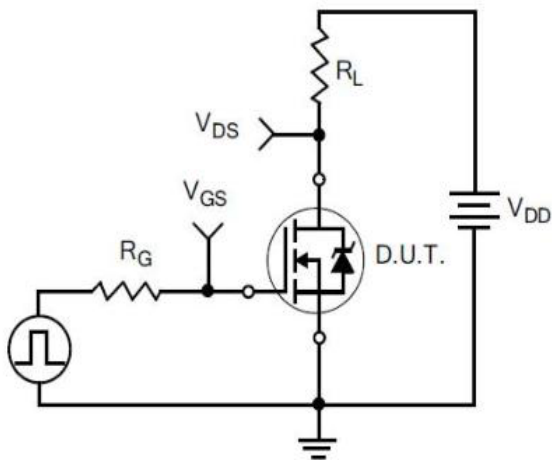
Typical Test Circuit



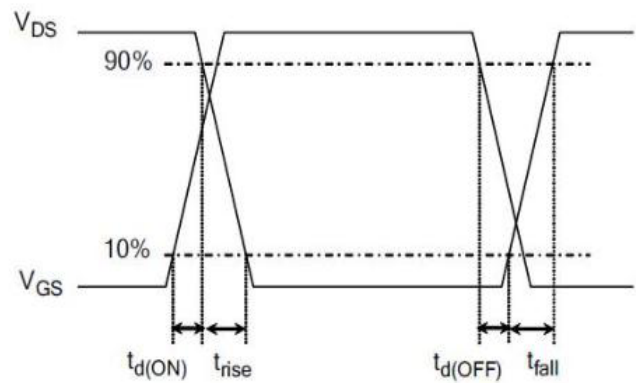
1) Gate Charge Test Circuit



2) Gate Charge Waveform

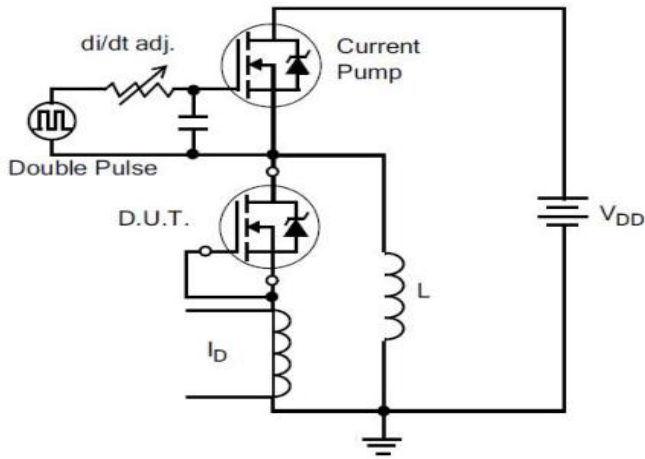


3) Resistive Switching Test Circuit

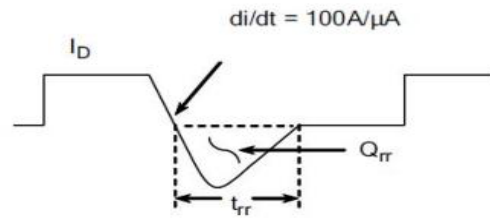


4) Resistive Switching Waveforms

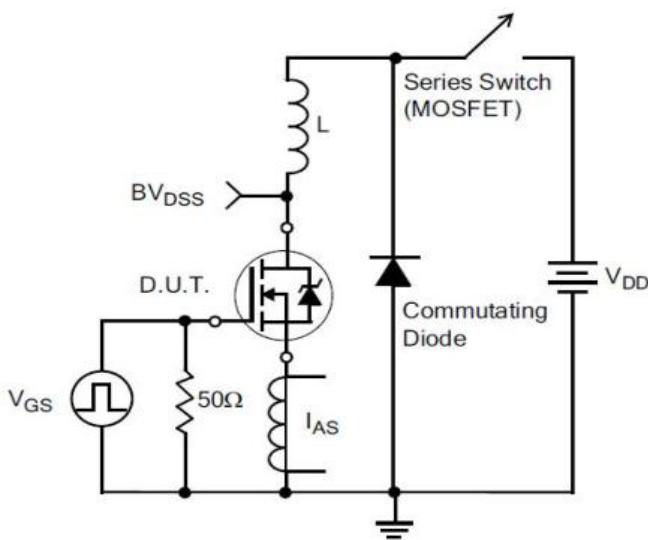
Typical Test Circuit



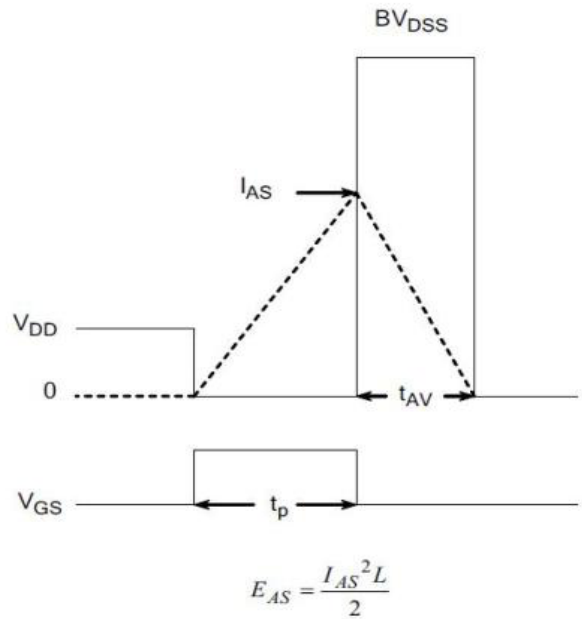
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

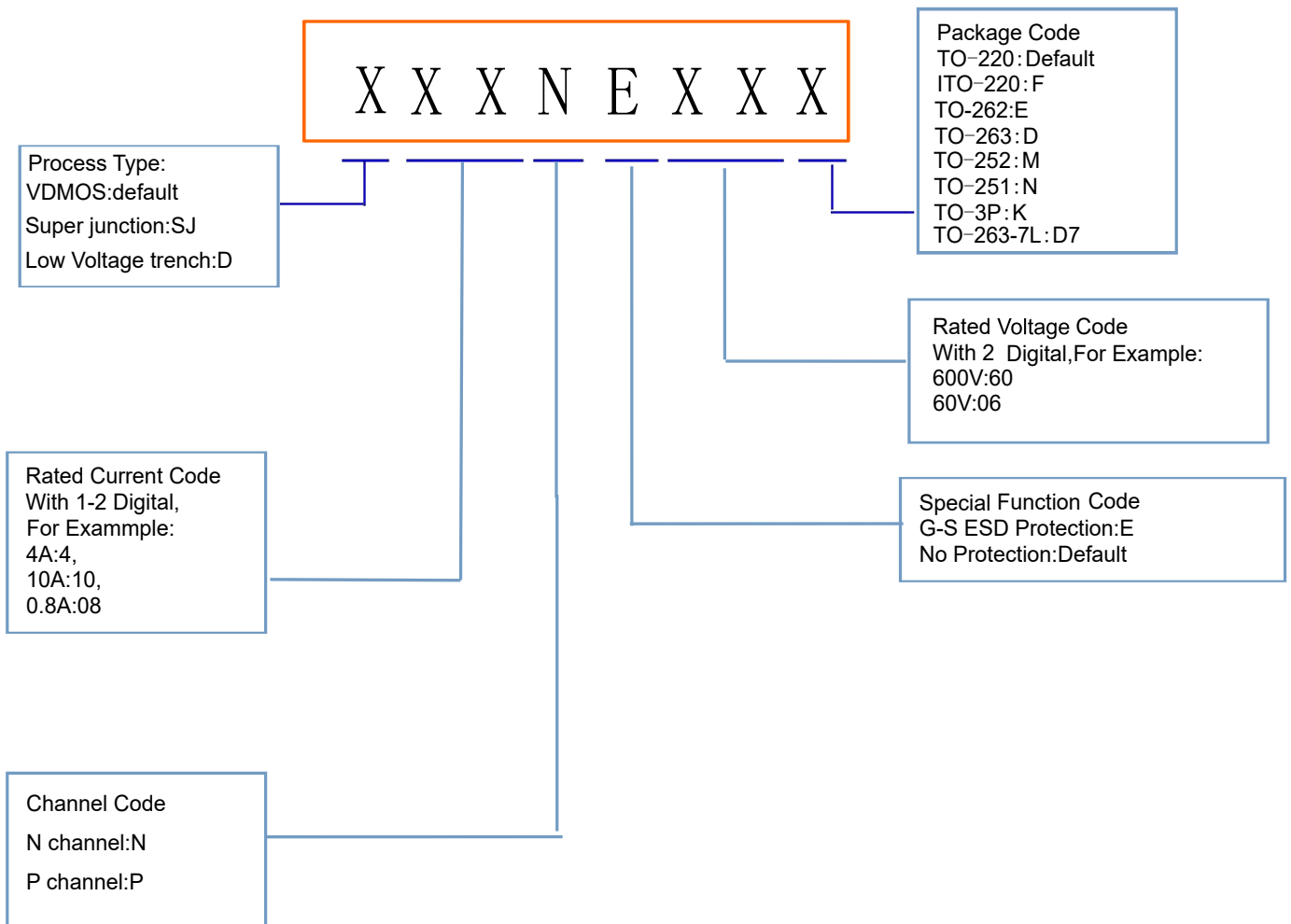


7) . Unclamped Inductive Switching Test Circuit



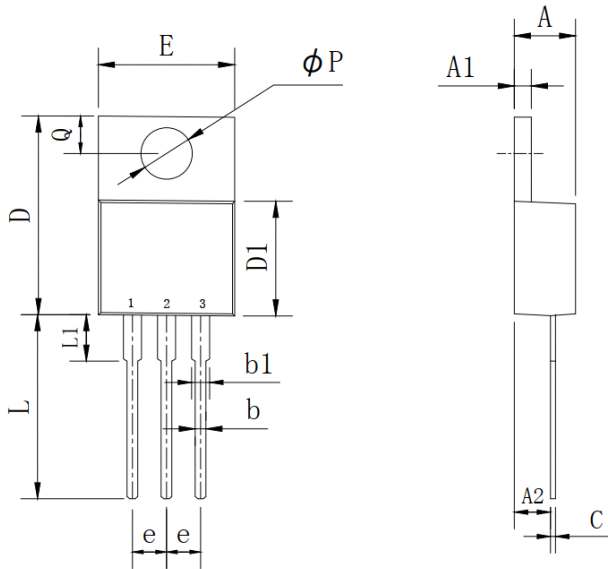
8) Unclamped Inductive Switching Waveforms

Product Names Rules



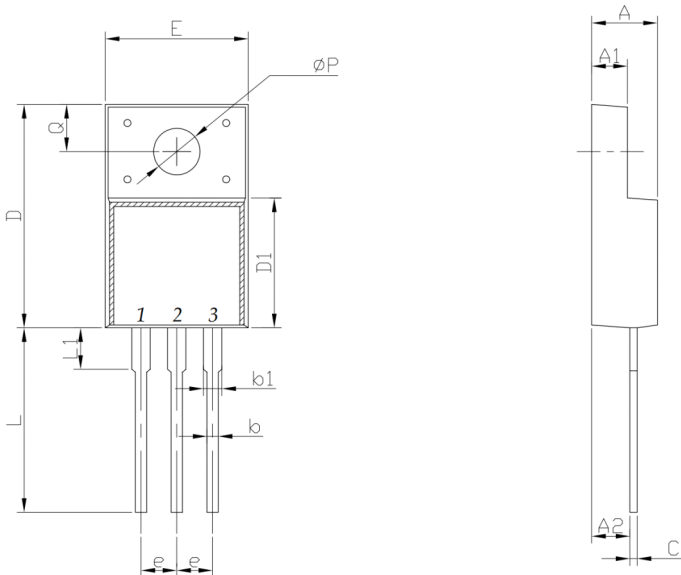
Dimensions

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

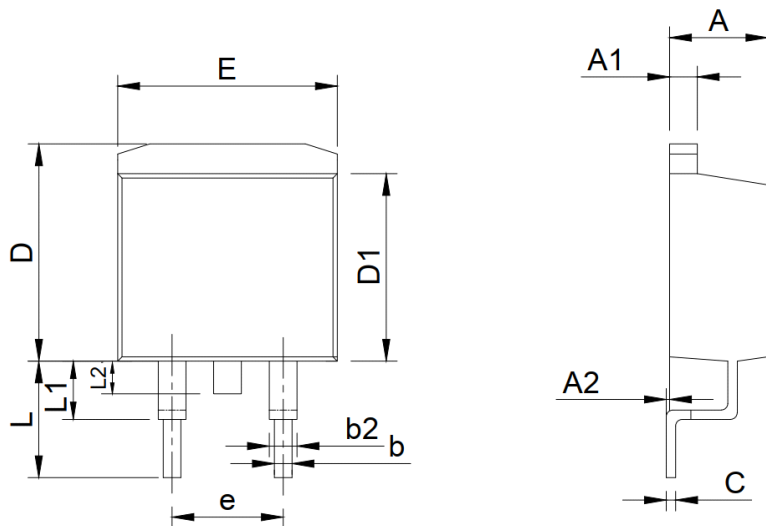
ITO-220 PACKAGE OUTLINE DIMENSIONS



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

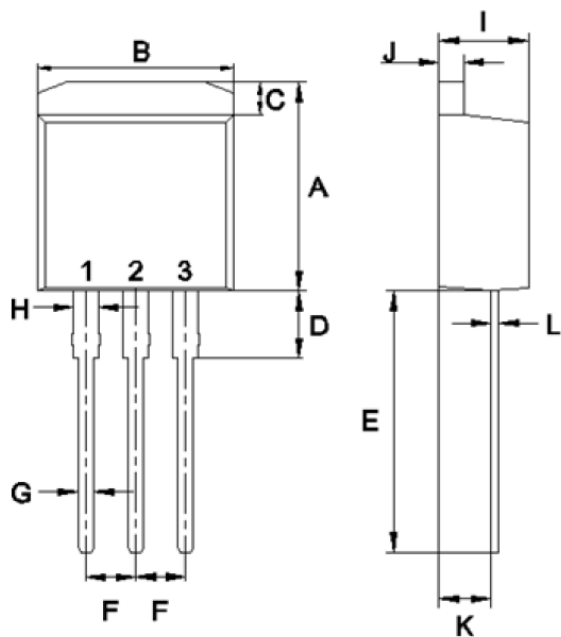
Dimensions

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

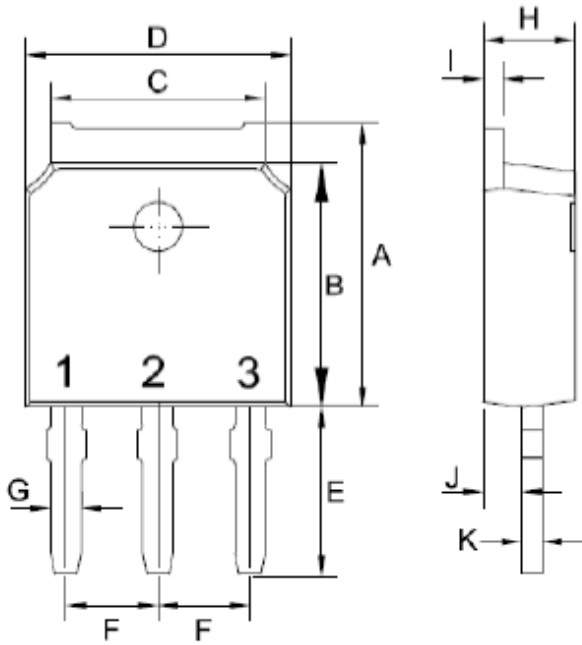
TO-262 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	10.14	11.14	0.399	0.439
B	9.57	10.57	0.377	0.416
C	1.15	1.84	0.045	0.072
D	2.95	3.95	0.116	0.156
E	12.25	13.75	0.482	0.541
F	2.34	2.74	0.092	0.108
G	0.51	1.11	0.020	0.044
H	0.97	1.57	0.038	0.062
I	4.25	4.87	0.167	0.192
J	1.07	1.47	0.042	0.058
K	2.03	2.92	0.080	0.115
L	0.3	0.6	0.012	0.024

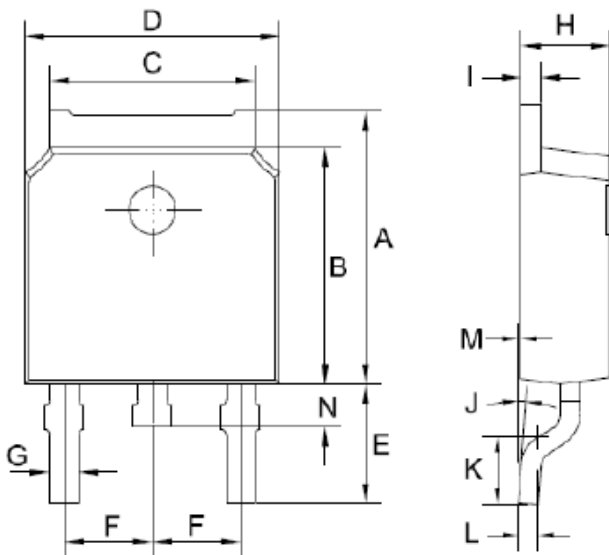
Dimensions

TO-251 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	6.85	7.25	0.270	0.285
B	5.8	6.3	0.228	0.248
C	5	5.53	0.197	0.218
D	6.3	6.8	0.248	0.268
E	3.5	4.35	0.138	0.171
F	2.19	2.39	0.086	0.094
G	0.45	0.85	0.018	0.033
H	2.2	2.4	0.087	0.094
I	0.41	0.61	0.016	0.024
J	0.71	1.31	0.028	0.052
K	0.41	0.61	0.016	0.024

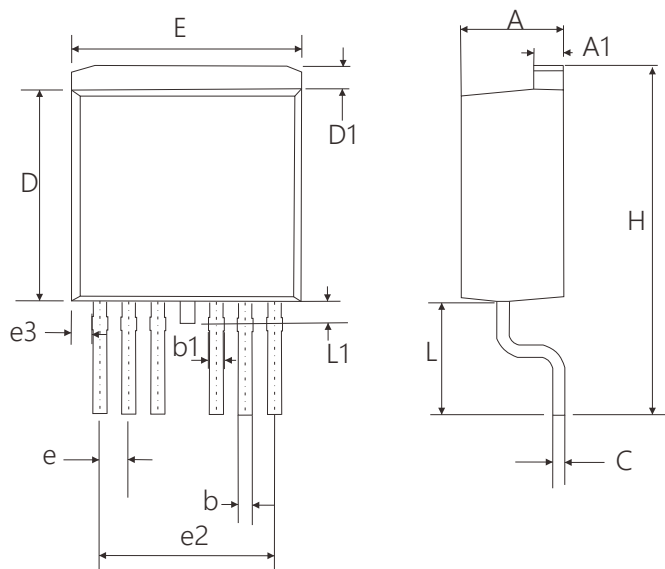
TO-252 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	6.85	7.25	0.270	0.285
B	5.8	6.3	0.228	0.248
C	5	5.53	0.197	0.218
D	6.3	6.8	0.248	0.268
E	2.6	3.3	0.102	0.130
F	2.19	2.39	0.086	0.094
G	0.45	0.85	0.018	0.033
H	2.2	2.4	0.087	0.094
I	0.41	0.61	0.016	0.024
J	0.71	1.31	0.028	0.052
K	1.45	1.85	0.057	0.073
L	0.41	0.61	0.016	0.024
M	0	0.12	0.000	0.005
P	0.6	1	0.024	0.039

Dimensions

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

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