SEMICONDUCTOR

SJ25N65 R Series
650V N-Channel Super Junction Power MOSFET

Genaral Description

The GS 650V 25A power MOSFET is a Low voltage N channel Multi-EPI Super-Junction power MOSFET sample with advanced technology to have 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.

Product Summary			
V_{DS}	$R_{DS(on)}$ (Ω) Typ	I_D (A)	Qg (Typ)
650V	0.12 @ 10V 12A	25	110nc

Features

- Low gate charge and improved dv/dt capacitance
- 100% avalanche tested
- Fast switching

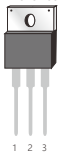
Mechanical Data

- Case:TO-220,ITO-220,ITO-220-N,TO-263,TO-263-7L, TO-247,TO-3P Packag

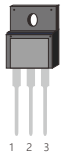
Application

- Switching applications

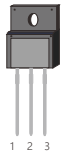
TO-220 SJ25N65R



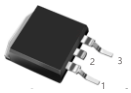
ITO-220 SJ25N65FR



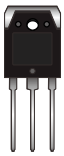
ITO-220-N SJ25N65FNR



TO-263 SJ25N65DR

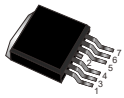


TO-3P SJ25N65KR



TO-247 SJ25N65PR

TO-263-7L SJ25N65D7R



Ordering Information

Part No.	Package Type	Package	Quality(box)
SJ25N65R	TO-220	Tube	1000
SJ25N65FR	ITO-220	Tube	1000
SJ25N65FNR	ITO-220-N	Tube	1000
SJ25N65DR	TO-263	Tape & Reel	800
SJ25N65PR	TO-247	Tube	360
SJ25N65KR	TO-3P	Tube	360
SJ25N65D7R	TO-263-7	Tape & Reel	800

Pin Definition:

1. Gate
2. Drain

3/4/5/6/7. Source

Block Diagram

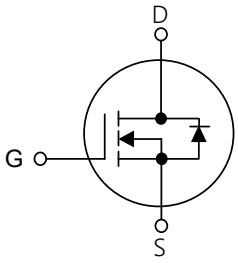


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	TO-220/TO-263/TO-247/TO-3P /TO-263-7	ITO-220 /ITO-220-N	Unit
Drain-Source Voltage		V_{DS}	650		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C=25°C	I_D	25	25※	A
	T_C=100°C		15	15※	
Pulsed Drain Current (Note 1)		I_{DM}	80		A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	500		mJ
Avalanche Current(Note 1)		I_{AR}	4		A
Repetitive Avalanche Energy(Note 1)		E_{AR}	1.2		mJ
Reverse Diode Recovery dv/dt(Note 3)		dv/dt	15		V/ns
Power Dissipation T_C=25°C		P_D	151	35	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~ +150		°C

※ limited by maximum junction temperature

Table 2.Thermal Characteristics

Parameter	Symbol	TO-220/TO-263 TO-247/TO-3P TO-263-7	ITO-220 ITO-220-N	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62	82	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	1.0	3.5	°C/W

Table 3. Electrical Characteristics (T_J=25°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=250μA	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=250μA	2. 0		4. 0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=12A		0.12	0. 18	Ω
Dynamic Characteristics(Note 5)							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V,f=1MHz		1650		pF
Output Capacitance		C_{OSS}			90		pF
Reverse Transfer Capacitance		C_{RSS}			9		pF
Switching Characteristics (Note 4)							
Turn-On Delay Time		td(on)	V_{DD}=520V		28		ns
Turn-On Rise Time		t_R			19		ns
Turn-Off Delay Time		td(off)			140		ns
Turn-Off Fall Time		tf			12		ns
Total Gate Charge		Q_G	V_{DS}=520V,I_D=12A, V_{GS}=10V		110		nC
Gate-Source Charge		Q_{GS}			9		nC
Gate-Drain Charge		Q_{GD}			15		nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=12A			1.5	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				25	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				75	A
Reverse Recovery Time		trr	V_{GS}=0V, I_S=12A dI$_F$/dt=100A/μs (Note 1)		190		ns
Reverse Recovery Charge		Q_{RR}			6		μC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=60mH, I_{AS}=3A,V_{DD}=150V,Starting T_J=25°C
3 I_{SD}≤4.5A,di/dt≤200A/μS,V_{DD}≤BV_{DSS},starting T_J=25℃
4 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%
5 Guaranteed by design,not subject to production

Typical Characteristics Diagrams

Figure 1.Output Characteristics

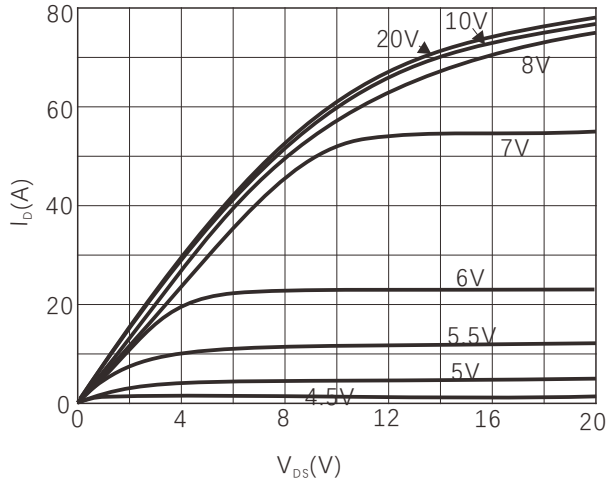


Figure 2. Transfer Characteristics

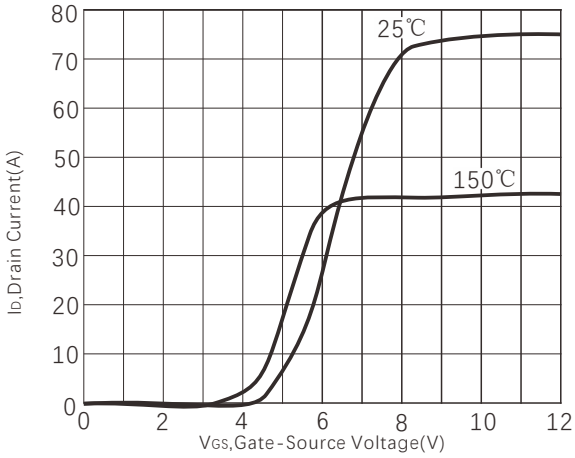


Figure 3.Source-Drain Diode Forward Voltage

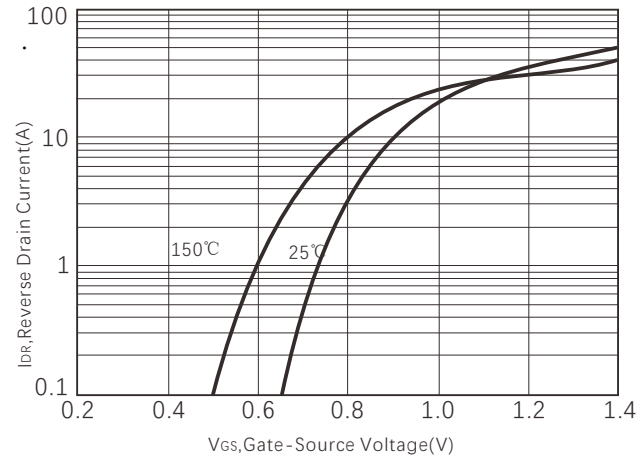


Figure 4. Capacitance

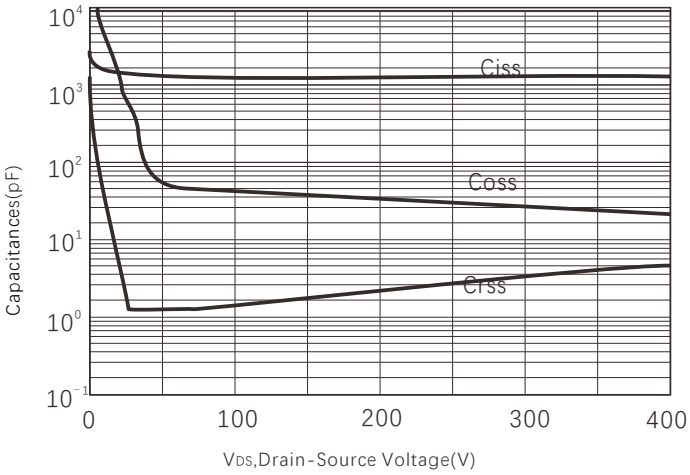


Figure 5.Gate charge

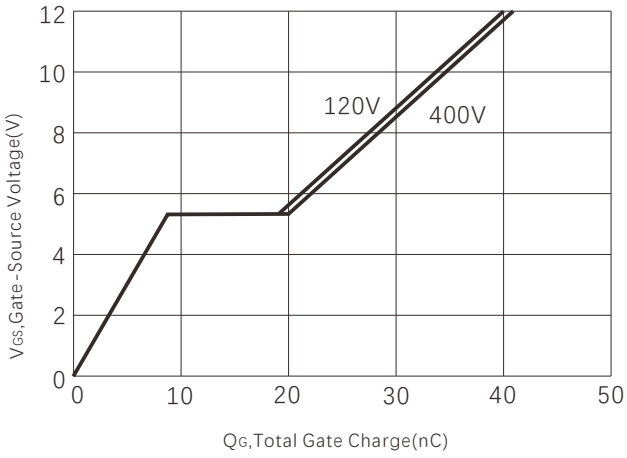


Figure6. $R_{DS(ON)}$ vs Junction Temperature

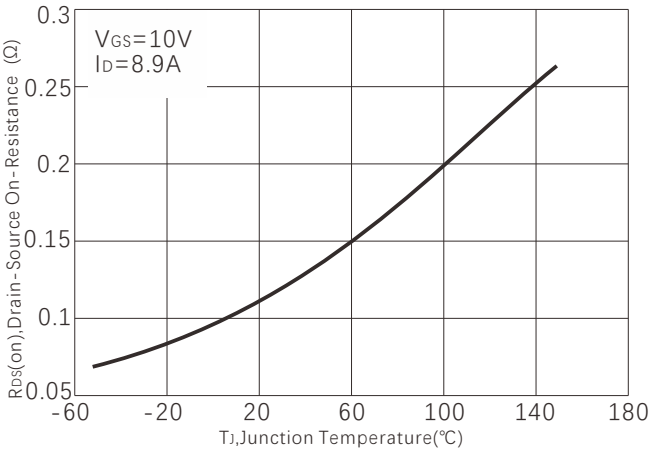


Figure 7.BV_{DSS} vs Junction Temperature

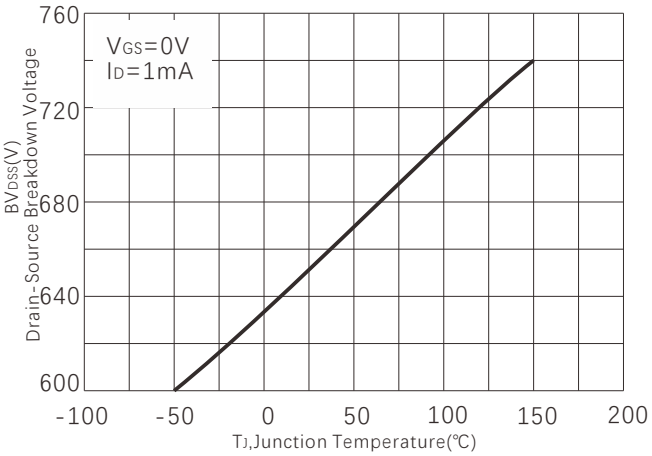


Figure 8. Safe operating area -Non ITO-220

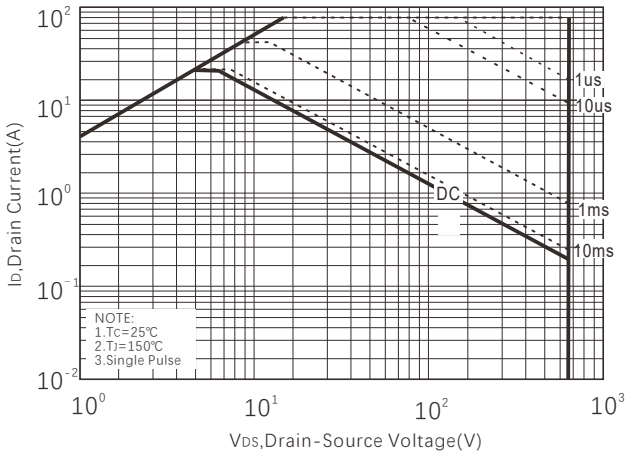


Figure 9. Safe operating area for ITO-220

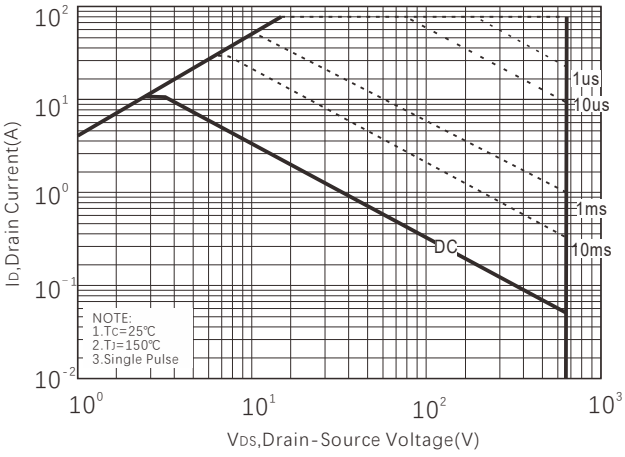


Figure 10. Maximum Transient Thermal Impedance -Non ITO-220

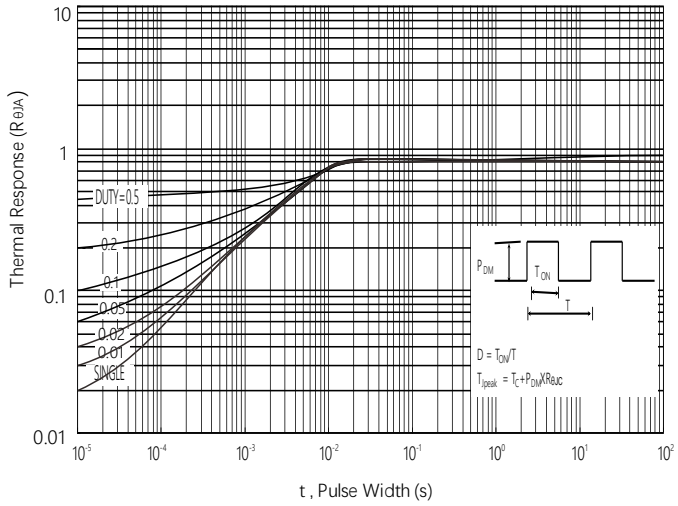


Figure 11. Maximum Transient Thermal Impedance - ITO-220

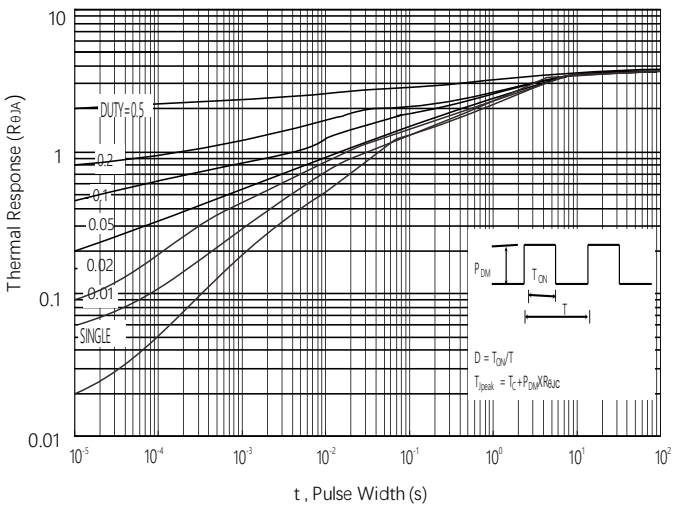


Figure 12. Power dissipation-Non ITO-220

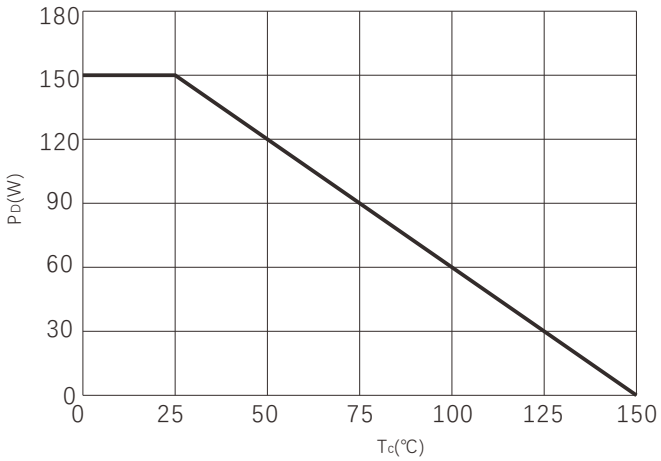
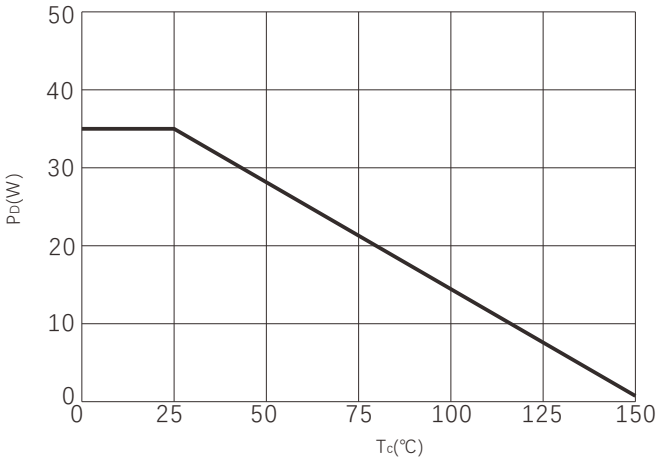
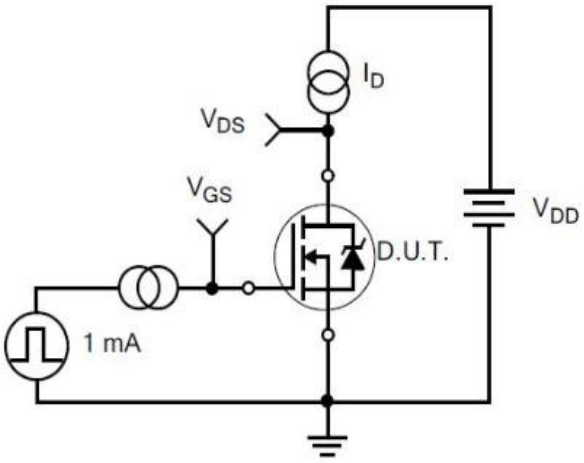


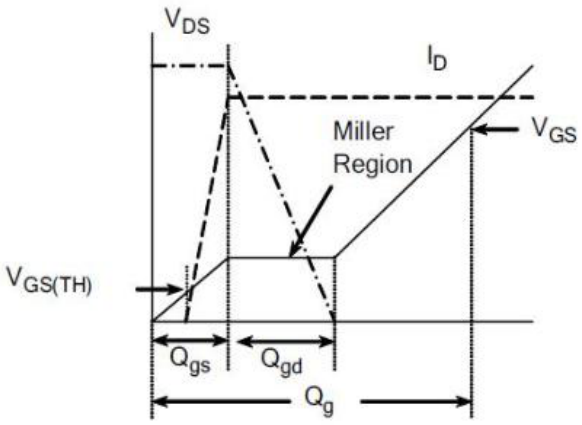
Figure 13. Power dissipation-ITO-220



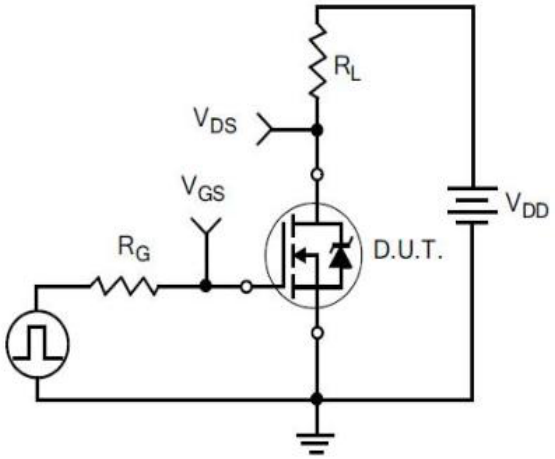
Typical Test Circuit



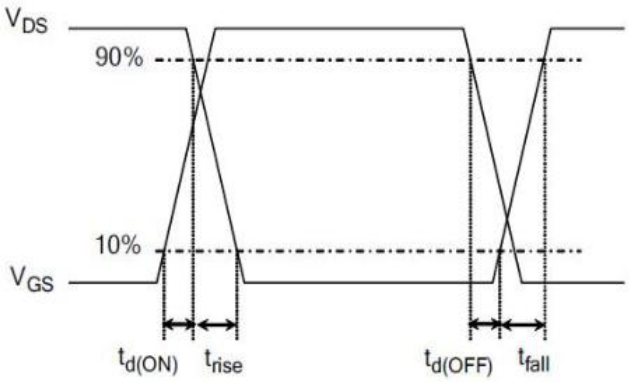
1) Gate Charge Test Circuit



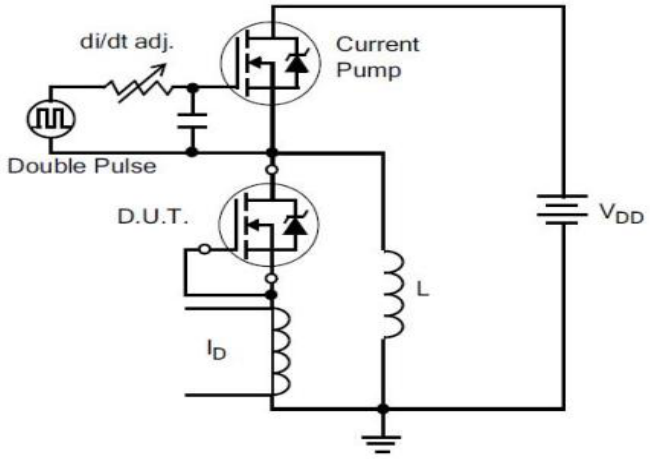
2) . Gate Charge Waveform



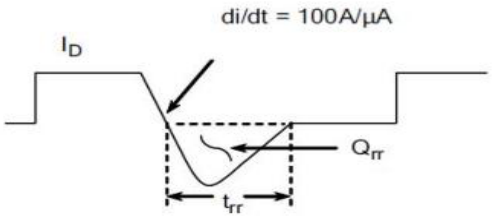
3) Resistive Switching Test Circuit



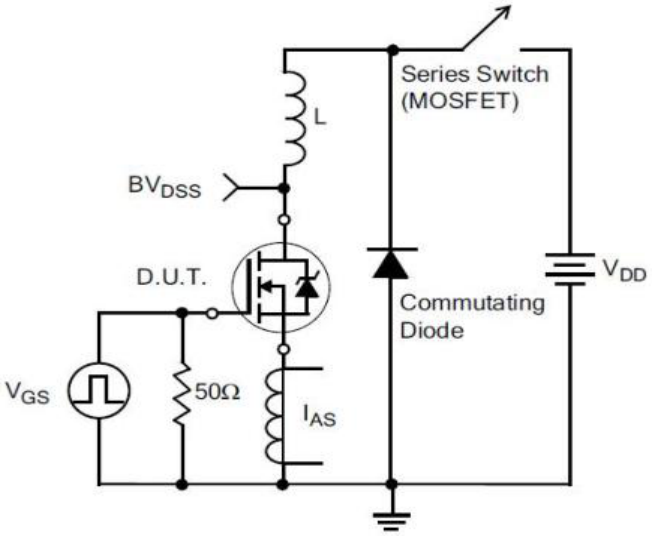
4) Resistive Switching Waveforms



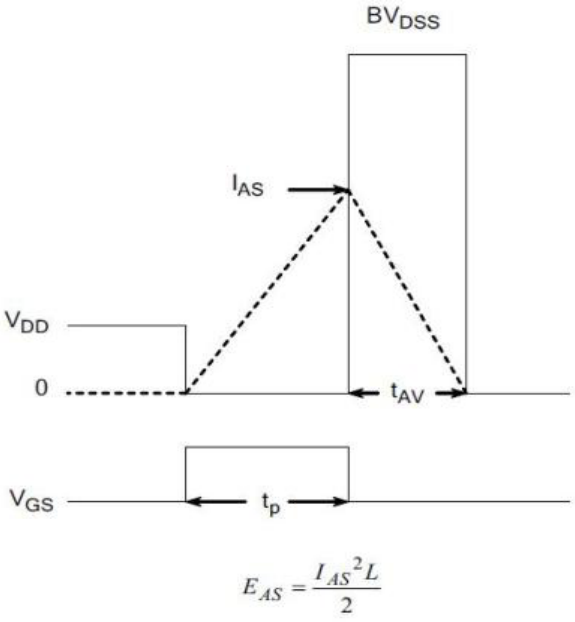
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

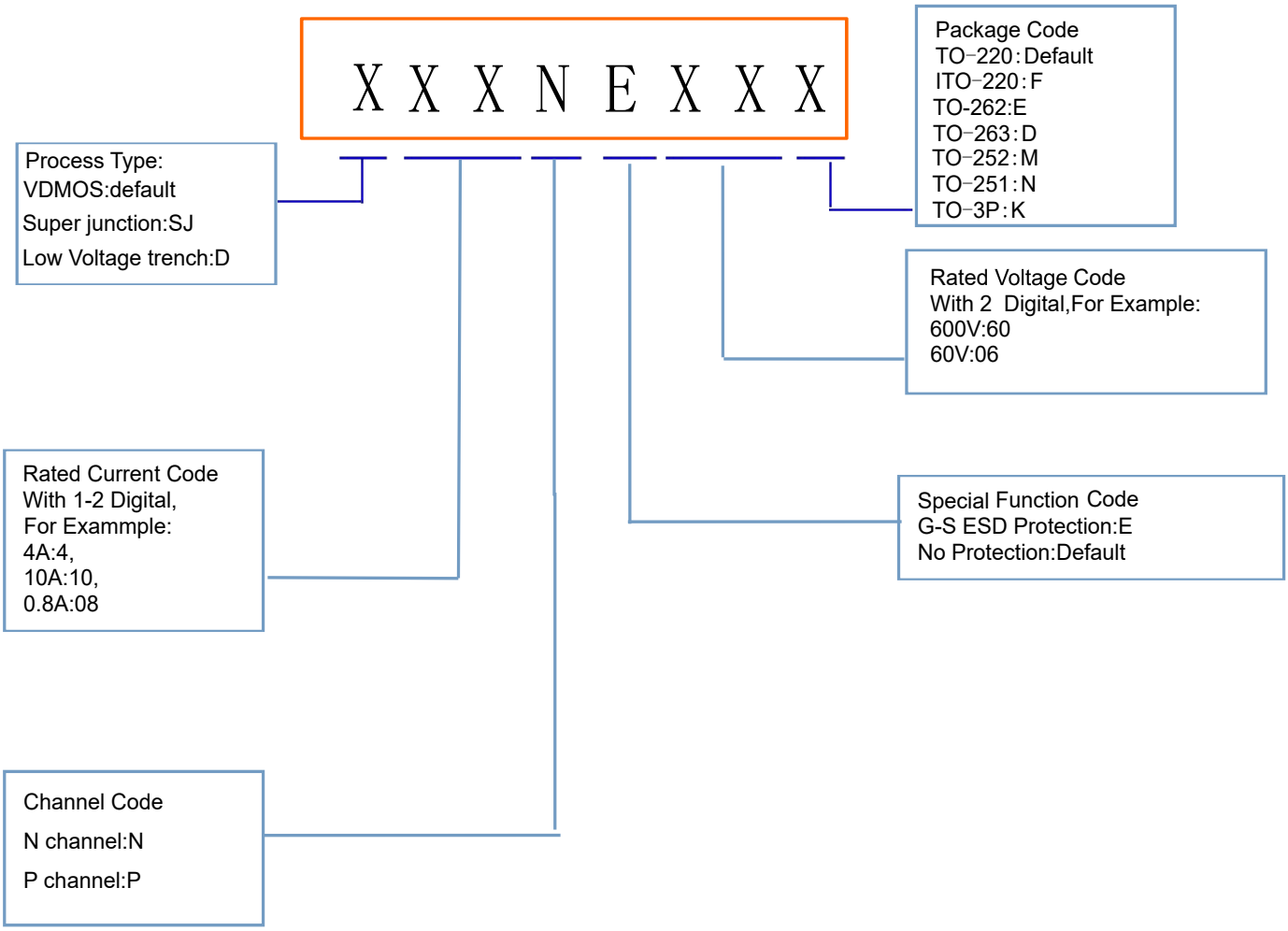


7) . Unclamped Inductive Switching Test Circuit



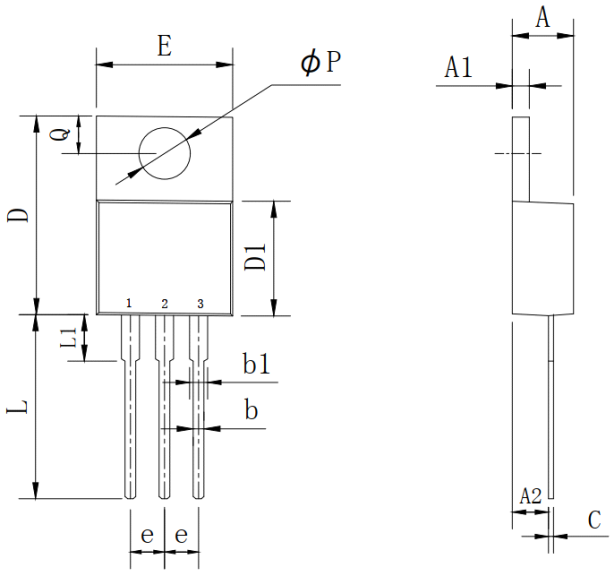
8) Unclamped Inductive Switching Waveforms

Product Names Rules



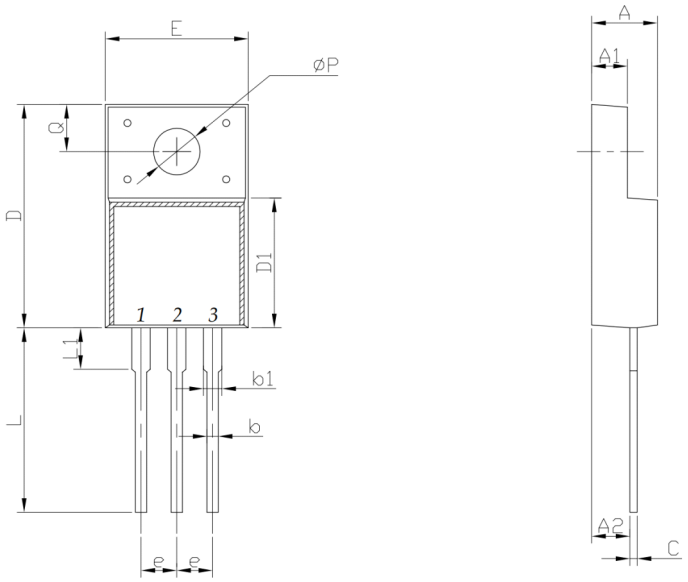
Dimensions

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

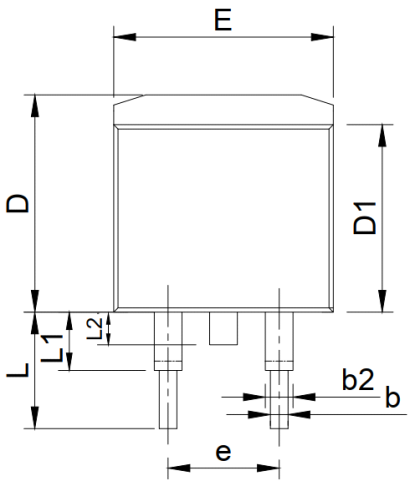
ITO-220 PACKAGE OUTLINE DIMENSIONS

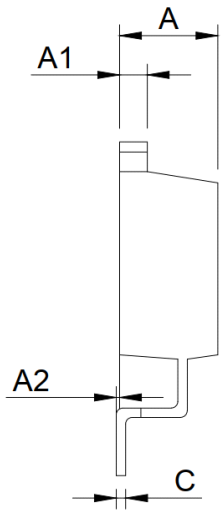


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
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

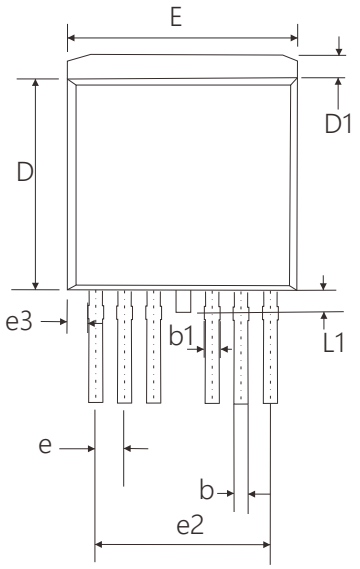
TO-263 PACKAGE OUTLINE DIMENSIONS

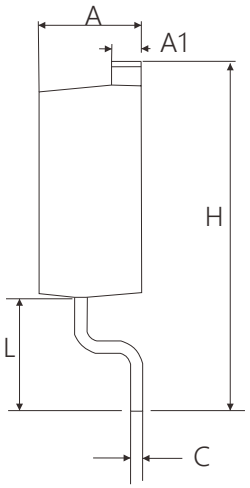




Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192	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-263-7L PACKAGE OUTLINE DIMENSIONS

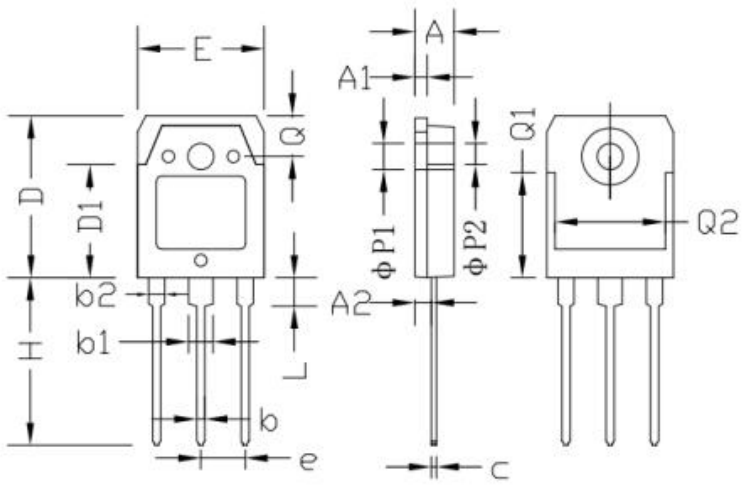




Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.75	0.167	0.187
A1	1.2	1.4	0.047	0.055
b	0.5	0.7	0.020	0.028
b1	0.5	0.9	0.020	0.035
C	0.4	0.6	0.016	0.024
D	9.05	9.45	0.356	0.372
D1	0.7	1.3	0.028	0.051
E	9.8	10.2	0.386	0.402
e	1.07	1.47	0.042	0.058
e2	7.32	7.92	0.288	0.312
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

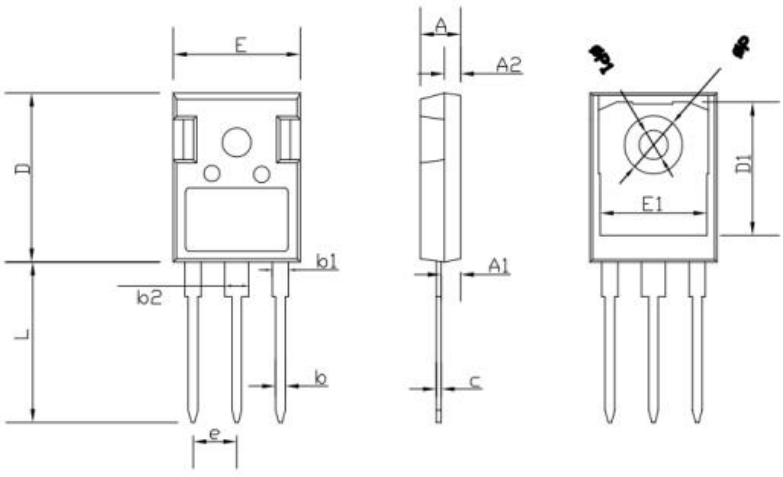
Dimensions

TO-3P PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	4.60	5.00	0.181	0.197
A1	1.45	1.65	0.057	0.065
A2	2.20	2.60	0.087	0.102
b	0.80	1.20	0.032	0.047
b1	2.80	3.20	0.110	0.126
b2	1.80	2.20	0.071	0.087
C	0.55	0.75	0.022	0.030
D	19.20	19.70	0.756	0.776
D1	13.10	14.70	0.516	0.578
E	15.40	15.80	0.607	0.623
e	5.45 TYP		0.215 TYP	
H	19.80	20.20	0.780	0.826
L	3.30	3.70	0.130	0.146
ΦP1	3.20 TYP		0.126 TYP	
ΦP2	3.50 TYP		0.138 TYP	
Q	5.00 TYP		0.197 TYP	
Q1	12.40 TYP		0.488 TYP	
Q2	12.6	-	0.496	-

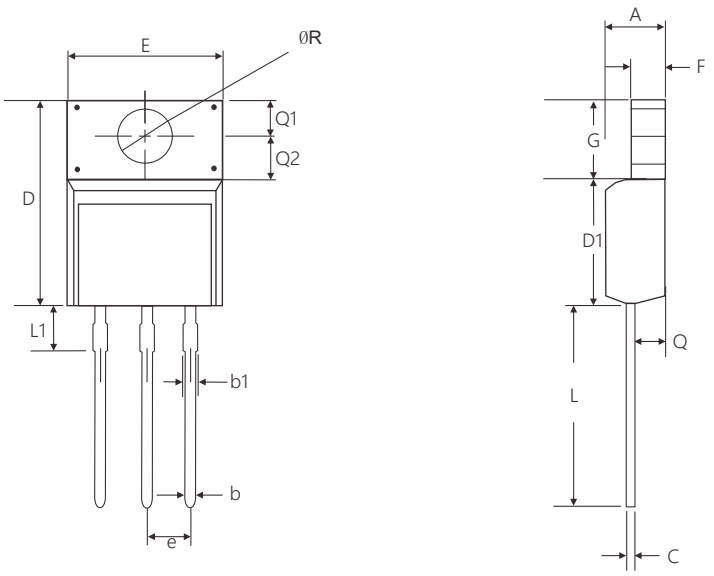
TO-247 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.96	2.06	0.0772	0.0812
b2	2.96	3.06	0.117	0.121
c	0.59	0.66	0.0232	0.0260
D	20.90	21.10	0.8235	0.8313
D1	16.25	16.85	0.6403	0.6639
E	15.70	15.90	0.6186	0.6265
E1	13.10	13.50	0.5161	0.5319
e	5.44		0.2143	
L	19.80	20.10	0.7801	0.7919
ΦP	3.50	3.70	0.1379	0.1458
ΦP1	0	7.30	0	0.2876

Dimensions

TO-220-N PACKAGE OUTLINE DIMENSIONS



ITO-220AB-N		
Dim	Min	Max
A	4.45	4.85
b	0.55	0.70
b1	0.60	0.80
C	0.45	0.60
D	15.50	16.50
D1	9.00	9.50
e	2.54	
E	9.90	10.50
F	2.34	2.74
G	6.30	6.90
L	12.70	13.30
L1	2.20	2.40
Q	2.70	2.90
Q1	3.40	3.60
Q2	3.20	3.40
ØR	3.00	3.40

Dimensions in millimeters

Friendship Reminder

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