

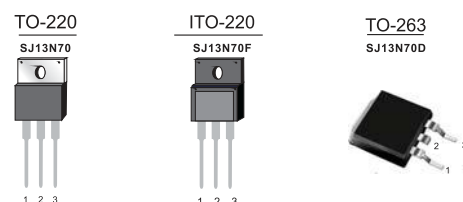
### FEATURES

- $R_{DS(ON)} < 0.38\Omega @ V_{GS} = 10V$
- 100% avalanche tested
- RoHS compliant

Product Summary			
$V_{DS}$	$R_{DS(on)}$ ( $\Omega$ ) Typ	$I_D$ (A)	$Q_g$ (Typ)
700V	0.36@10V	13	34nc

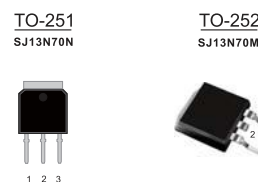
### MECHANICAL DATA

- Case: TO-220, ITO-220, TO-251, TO-252, TO-263 package



### Ordering Information

Part No.	Package Type	Package	Quality(box)
SJ13N70	TO-220	Tube	1000
SJ13N70F	ITO-220	Tube	1000
SJ13N70E	TO-263	Tape & Reel	800
SJ13N70M	TO-252	Tape & Reel	3000
SJ13N70N	TO-251	Tube	1000



### Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

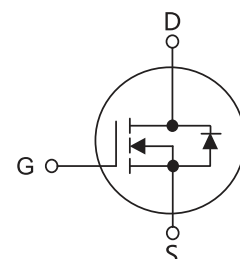


Table1 Absolute Maximum Ratings ( $T_C = 25^\circ C$ , unless otherwise specified)

Parameter	Symbol	TO-220/TO-263	ITO-220	Unit
		TO-251/TO-252		
Drain-Source Voltage	$V_{DS}$	700		V
Gate-Source Voltage	$V_{GS}$	$\pm 30$		V
Continuous Drain Current	$I_D$	$T_C = 25^\circ C$	13	A
		$T_C = 100^\circ C$	9	
Pulsed Drain Current (Note 1)	$I_{DM}$	46		A
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	280		mJ
Avalanche Current (Note 1)	$I_{AR}$	2.3		A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	1.2		mJ
Peak Diode Recovery $dv/dt$ (Note 3)	$dv/dt$	15		V/ns
Drain Source voltage slope ( $V_{DS} = 480V$ )	$dV_{DS}/dt$	50		V/ns
Power Dissipation $T_C = 25^\circ C$	$P_D$	151	35	W
Operating Junction and Storage Temperature	$T_J/T_{STG}$	-55 ~ +150		$^\circ C$
Maximum Temperature for soldering	$T_L$	300		$^\circ C$

## SJ13N70 Series

Table 2. Thermal Characteristics

Parameter	Symbol	TO-220/TO-263	ITO-220	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62	62	$^{\circ}C/W$
Thermal resistance Junction to Case	$R_{\theta JC}$	0.82	3.57	$^{\circ}C/W$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Off Characteristics							
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	700	--	--	V	
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=700V, V_{GS}=0V$	--	--	1	$\mu A$	
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	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	--	4.5	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=6.5A$	--	0.36	0.38	$\Omega$	
Dynamic Characteristics(Note 5)							
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	--	780	--	pF	
Output Capacitance	$C_{OSS}$		--	23	--	pF	
Reverse Transfer Capacitance	$C_{RSS}$		--	1.9	--	pF	
Switching Characteristics (Note 5)							
Turn-On Delay Time	$t_d(on)$	$V_{DD}=400V, I_D=6.5A,$ $R_G=20\Omega$	--	17	--	ns	
Turn-On Rise Time	$t_r$		--	12	--	ns	
Turn-Off Delay Time	$t_d(off)$		--	130	--	ns	
Turn-Off Fall Time	$t_f$		--	10	--	ns	
Total Gate Charge	$Q_G$	$V_{DS}=400V, I_D=6.5A,$ $V_{GS}=10V$	--	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	$V_{SD}$	$V_{GS}=0V, I_S=6.5A$	--	0.9	1.5	V	
Maximum Continuous Drain-Source Diode Forward Current	$I_S$		--	--	10	A	
Reverse Recovery Time	$trr$	$V_{GS}=0V, I_F=6.5A$	--	300	--	ns	
Reverse Recovery Charge	$Q_{RR}$	$di_F/dt=100A/\mu s$ (Note 1)	--	3500	--	nC	

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

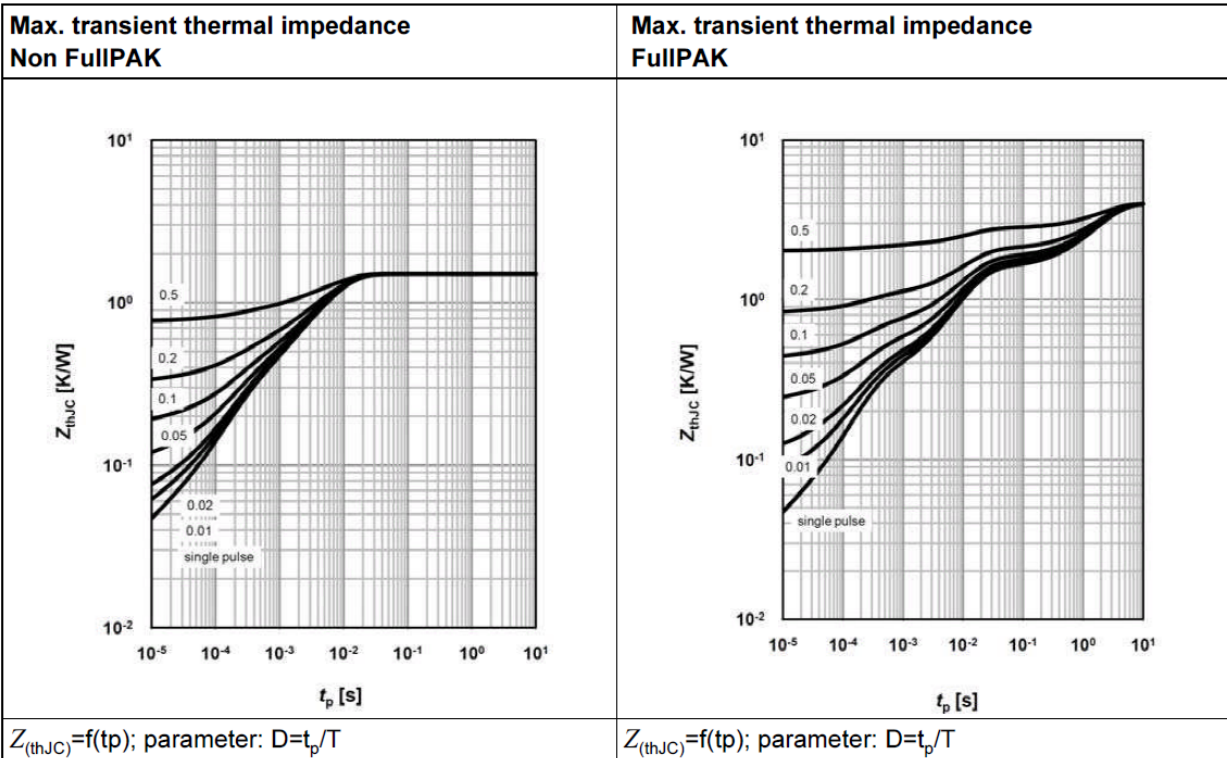
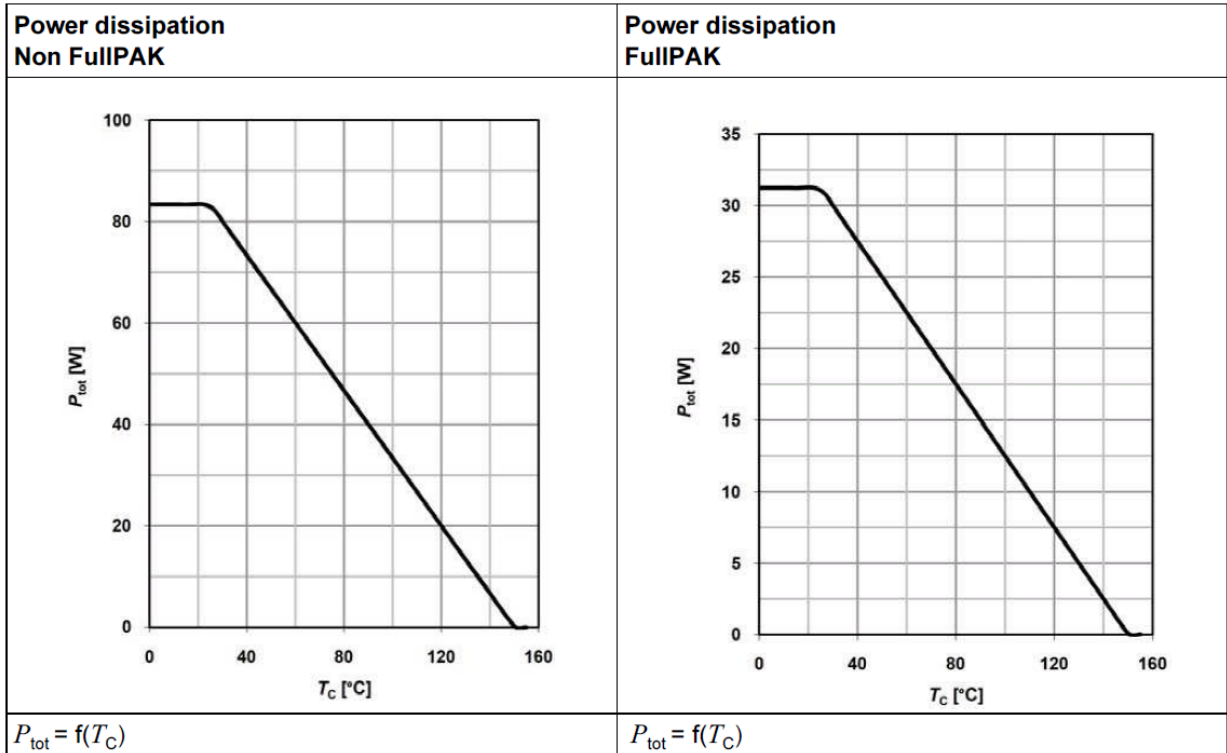
2  $I_{AS}=3A, V_{DD}=150V$ , Starting  $T_J=25^{\circ}C$

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

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

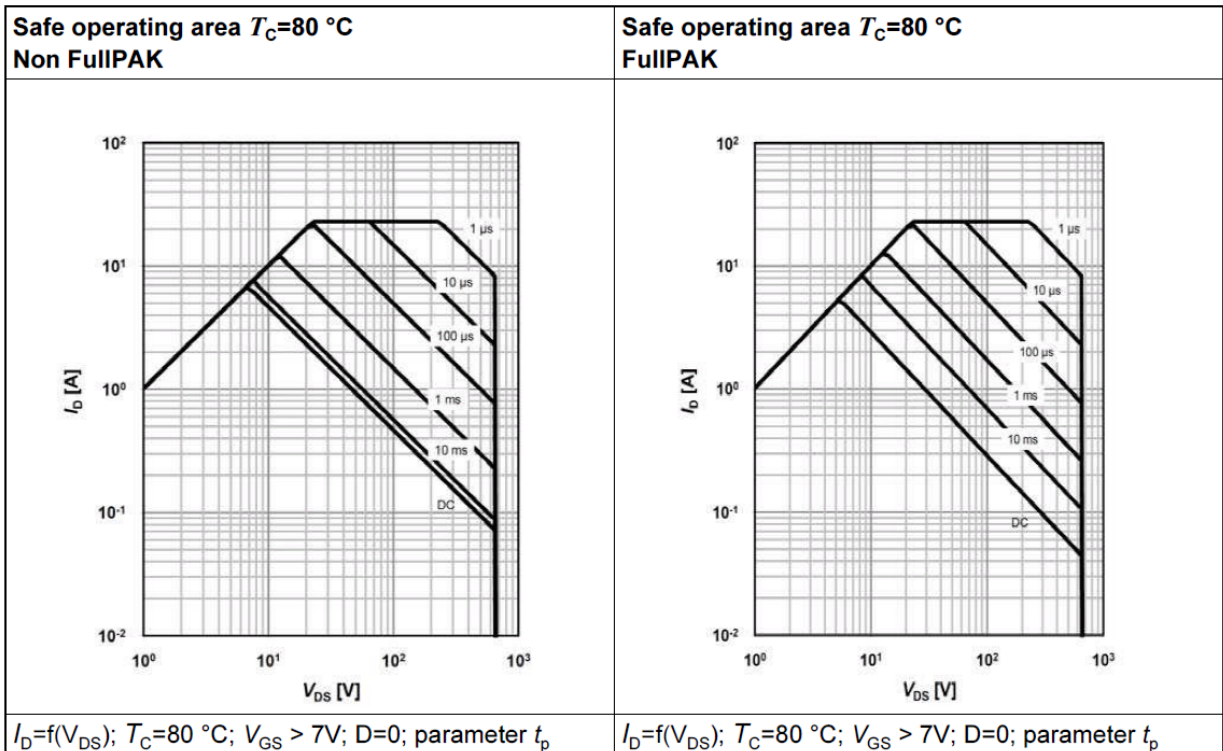
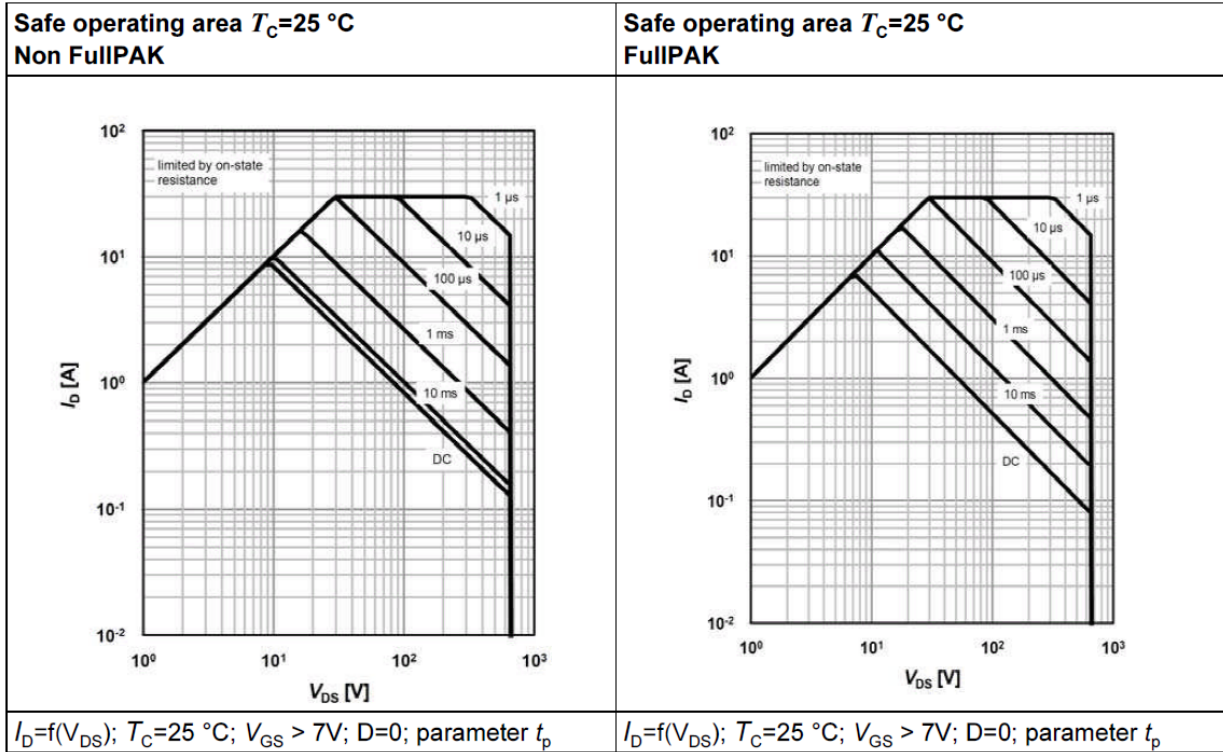
5 Guaranteed by design, not subject to production

Typical characteristics Diagrams

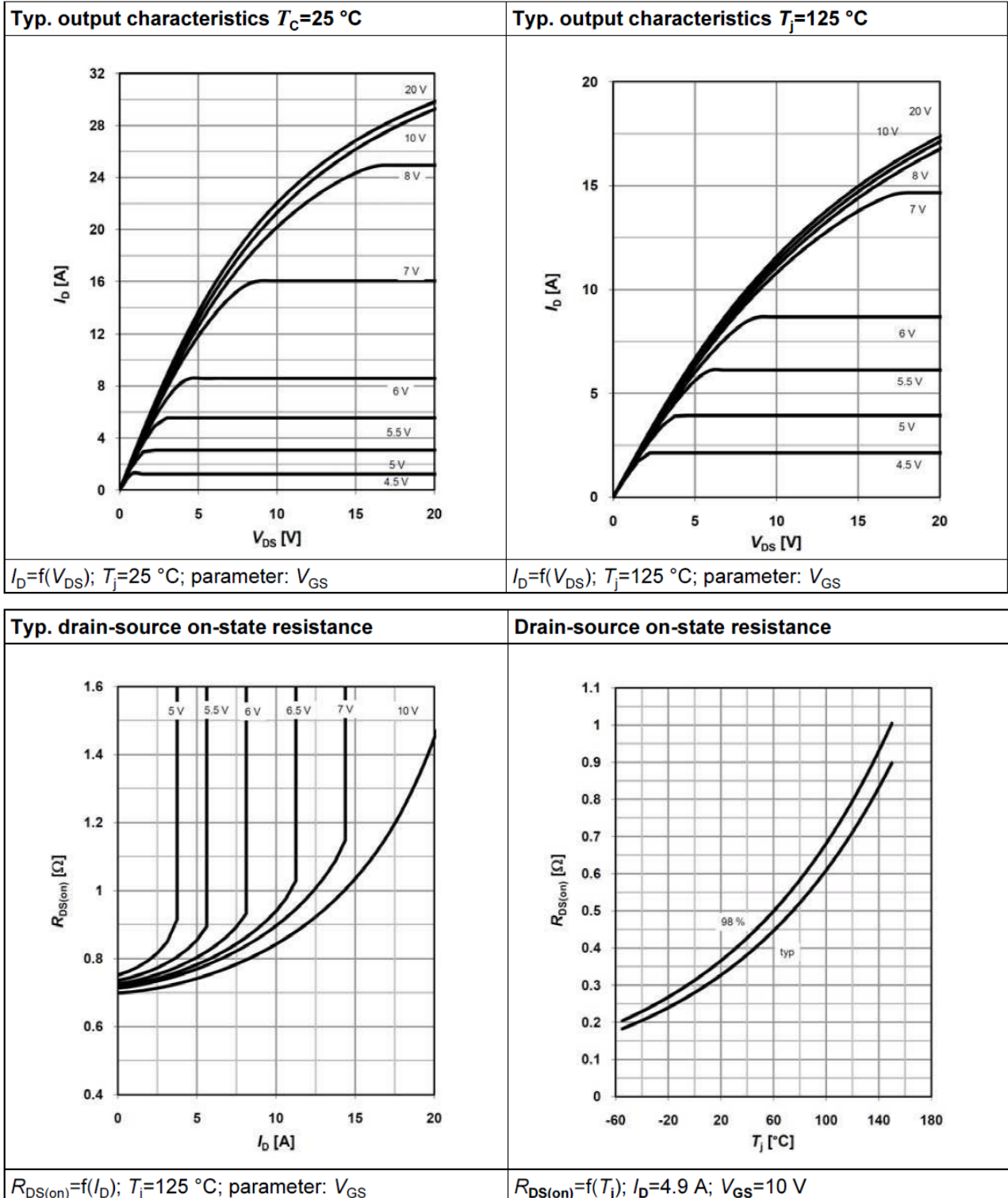


# SJ13N70 Series

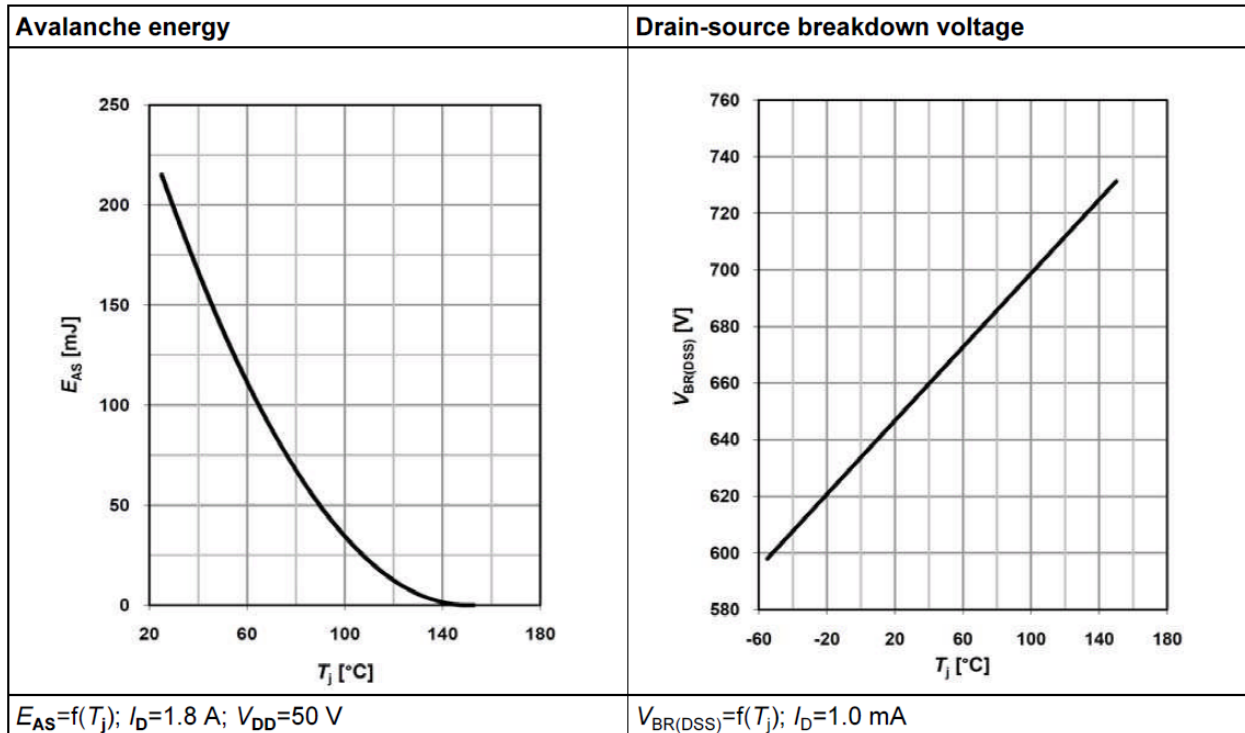
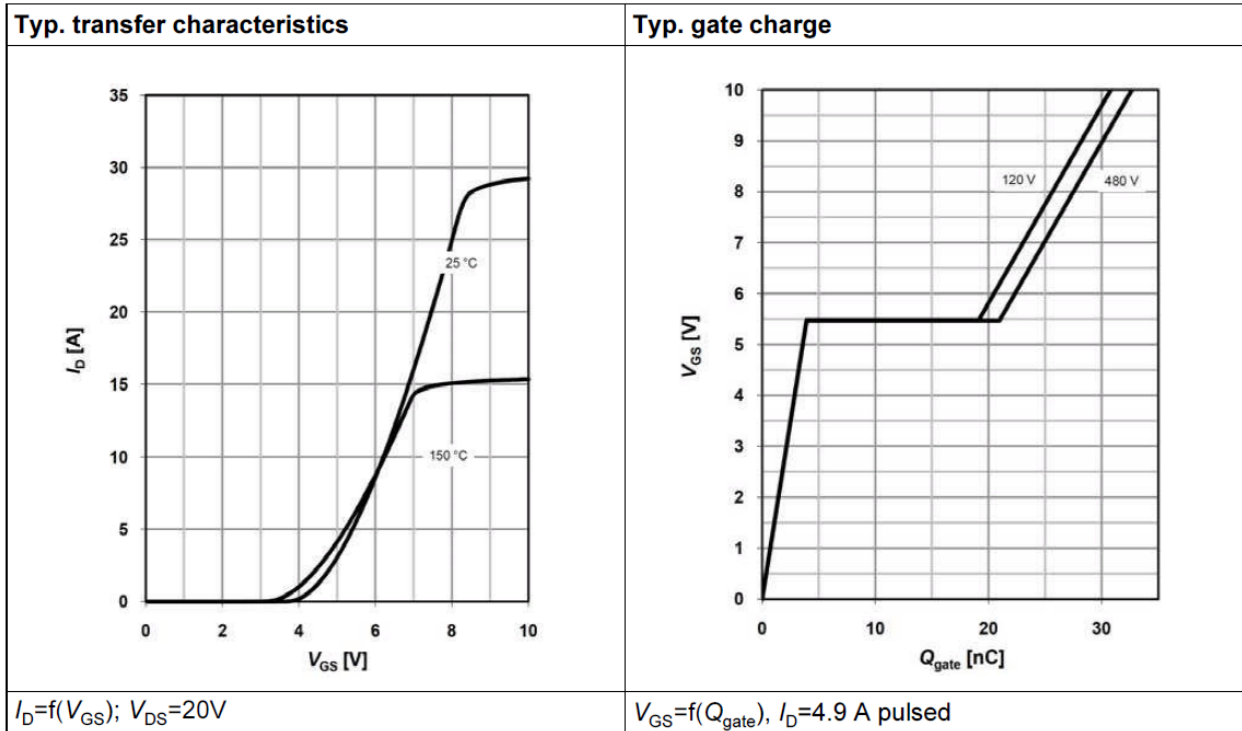
## Typical characteristics Diagrams



Typical characteristics Diagrams

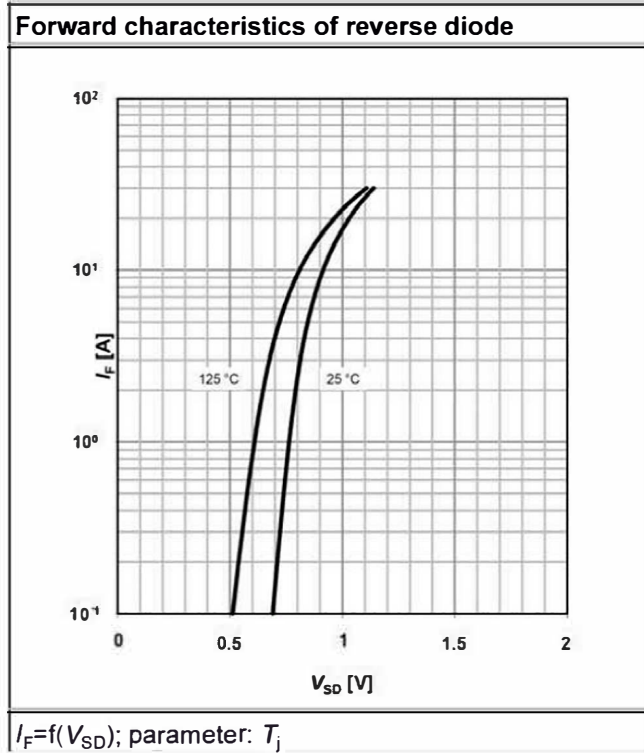
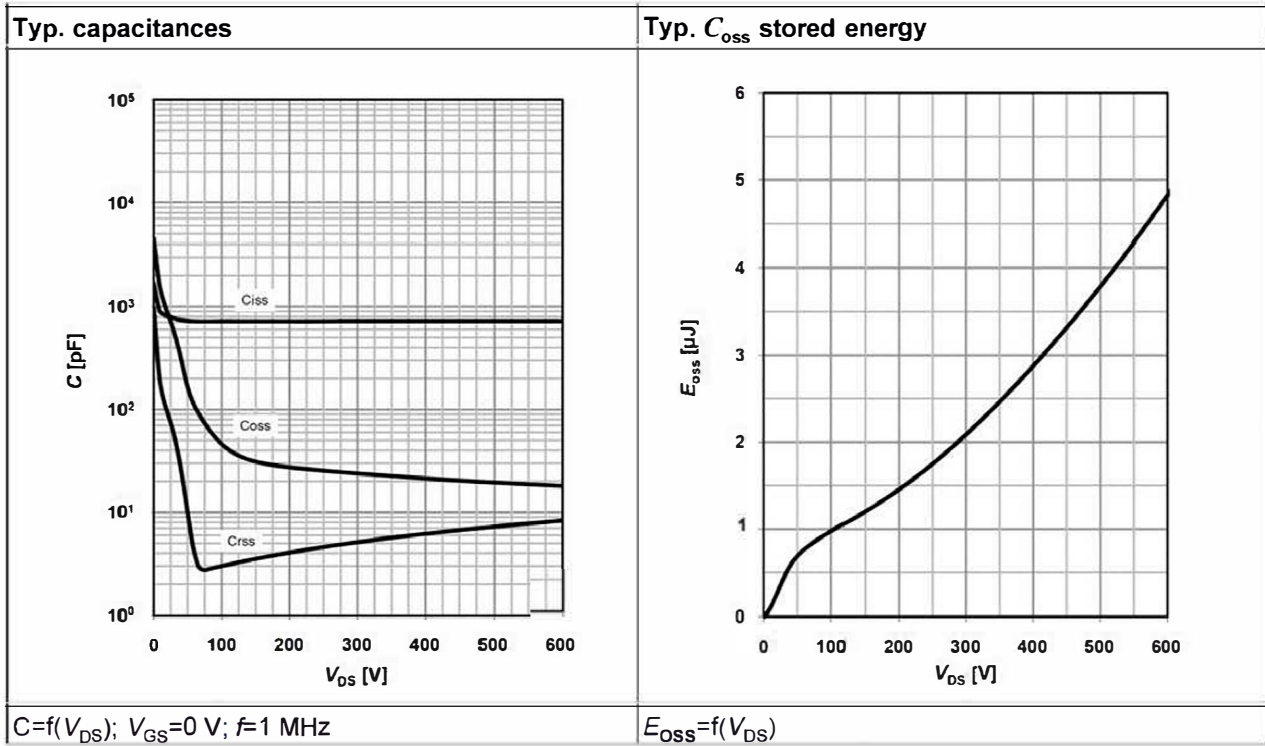


Typical characteristics Diagrams



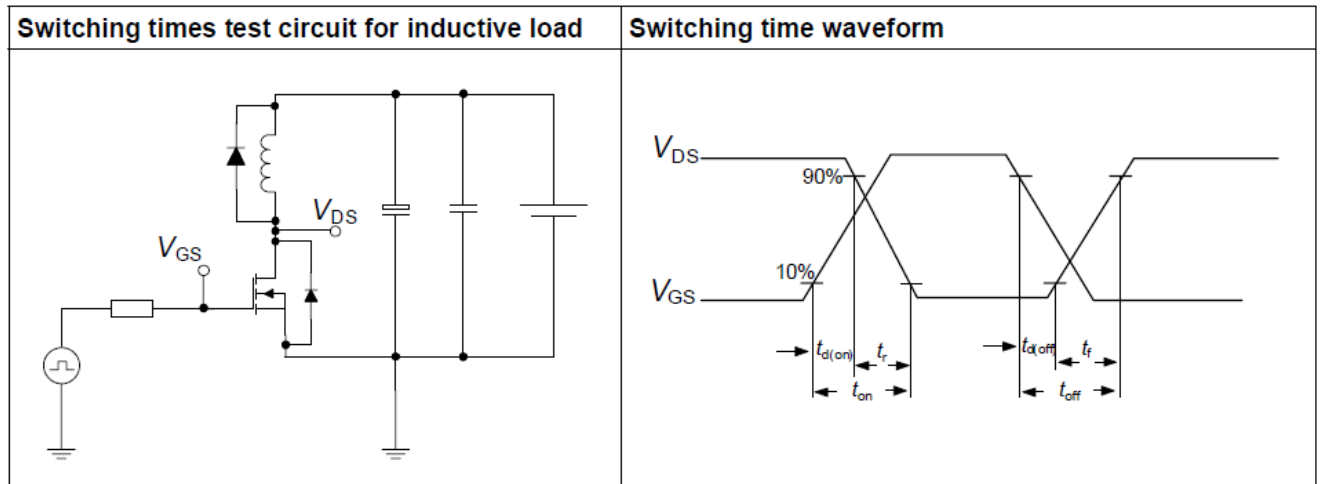
# SJ13N70 Series

## Typical characteristics Diagrams

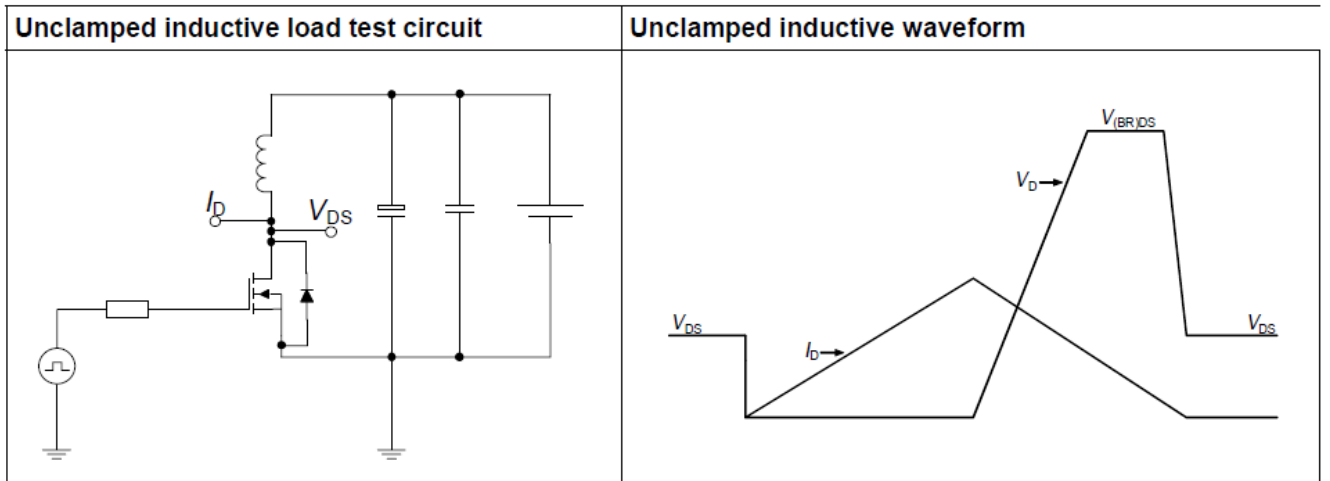


Typical characteristics Diagrams

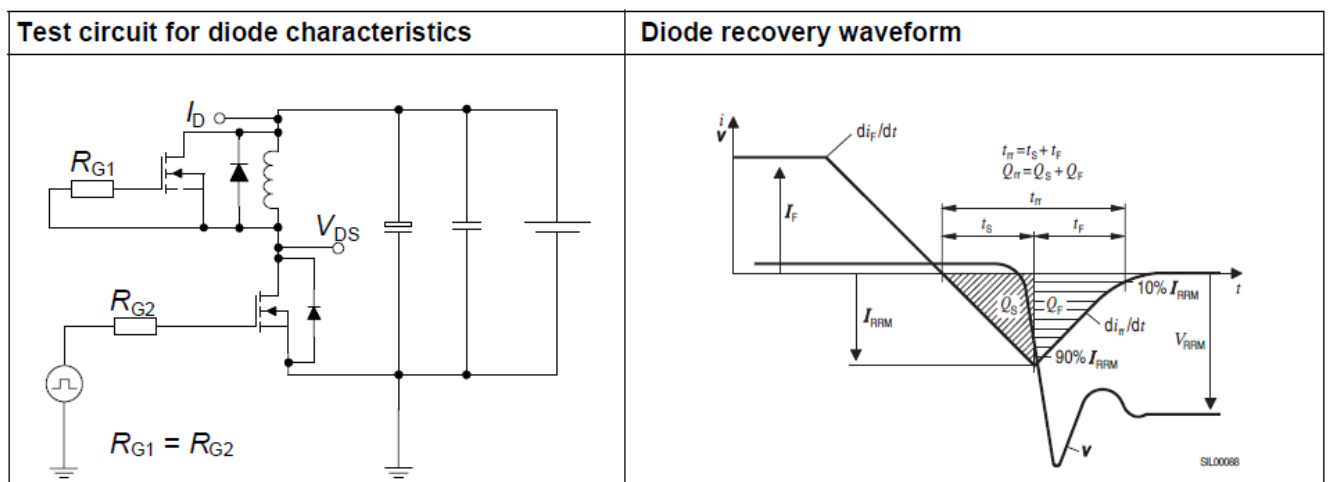
**Table 20 Switching times test circuit and waveform for inductive load**



**Table 21 Unclamped inductive load test circuit and waveform**

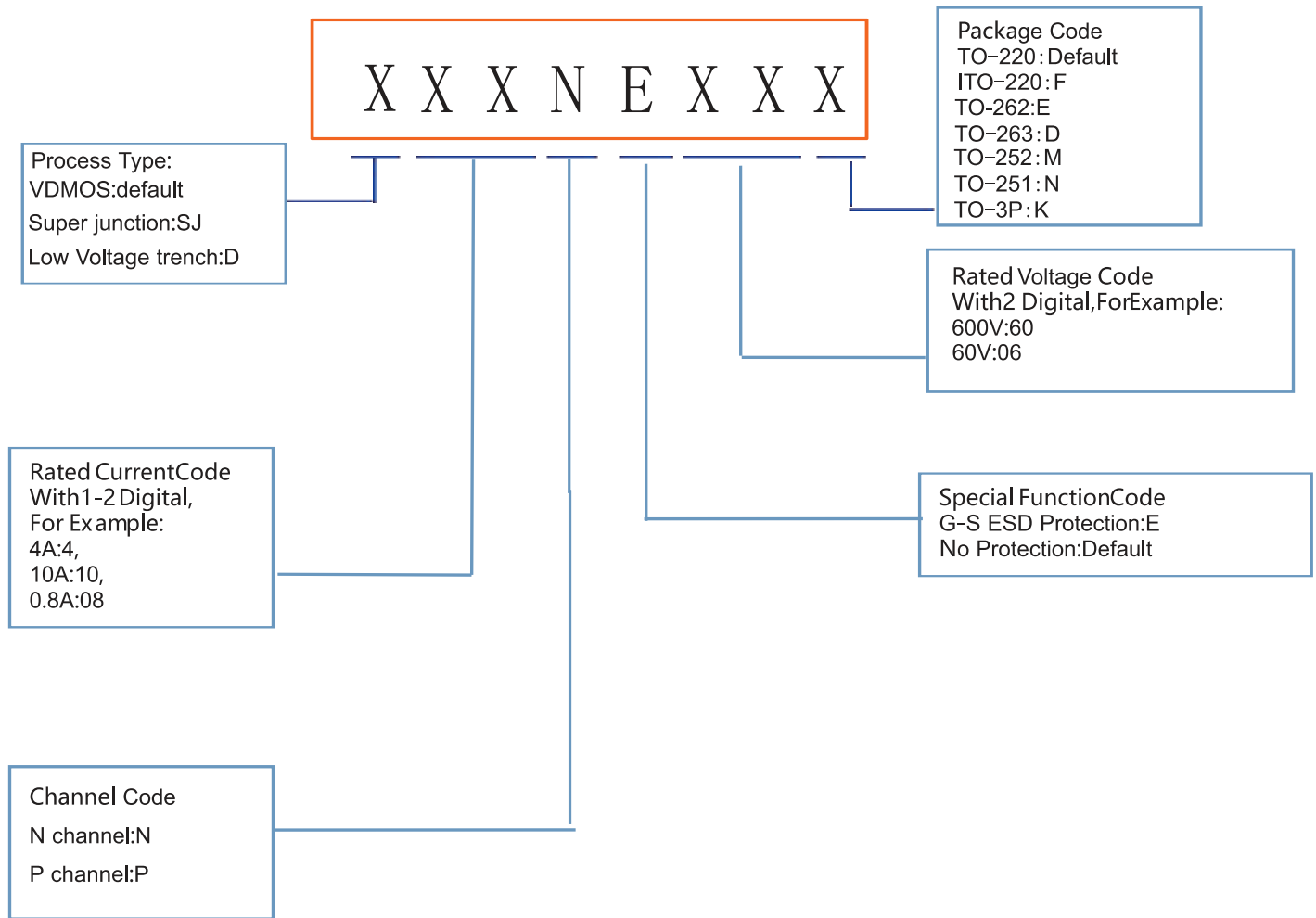


**Table 22 Test circuit and waveform for diode characteristics**





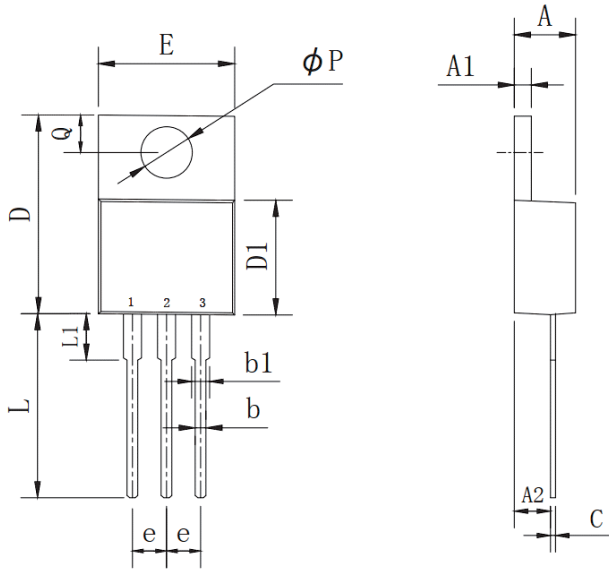
Product Names Rules



# SJ13N70 Series

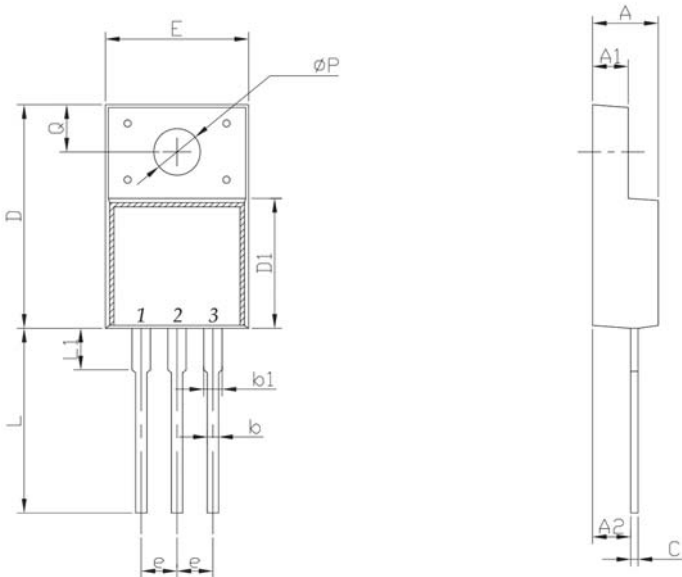
## Dimensions

### 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

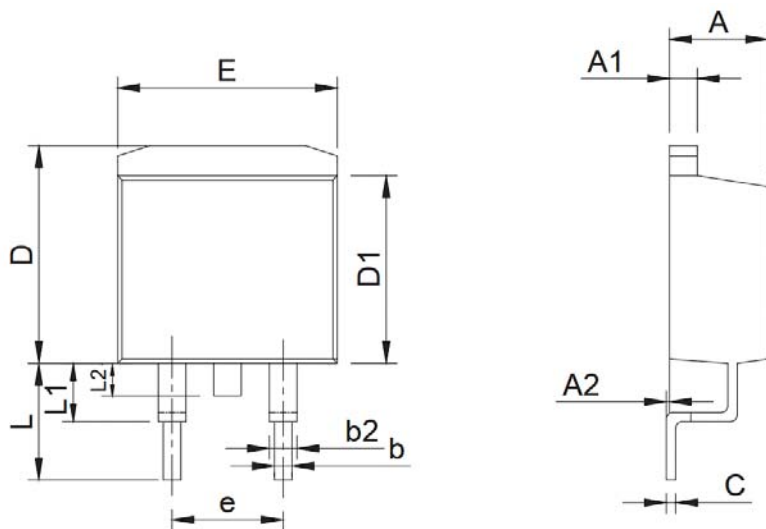


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108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

# SJ13N70 Series

## Dimensions

### TO-263 PACKAGE OUTLINE DIMENSIONS

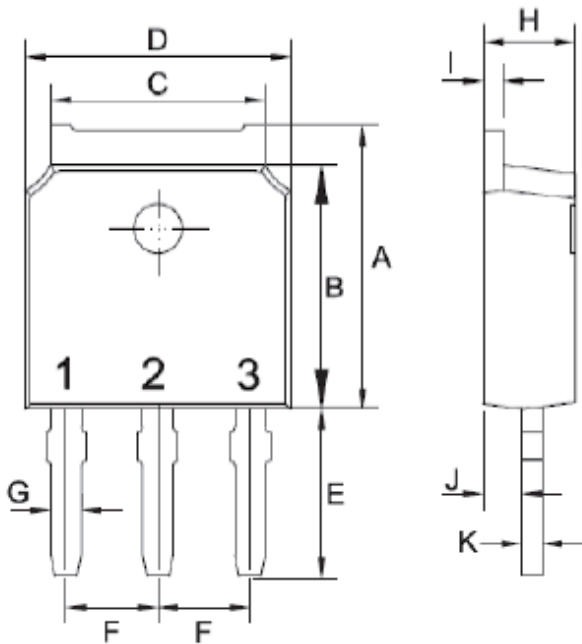


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192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

# SJ13N70 Series

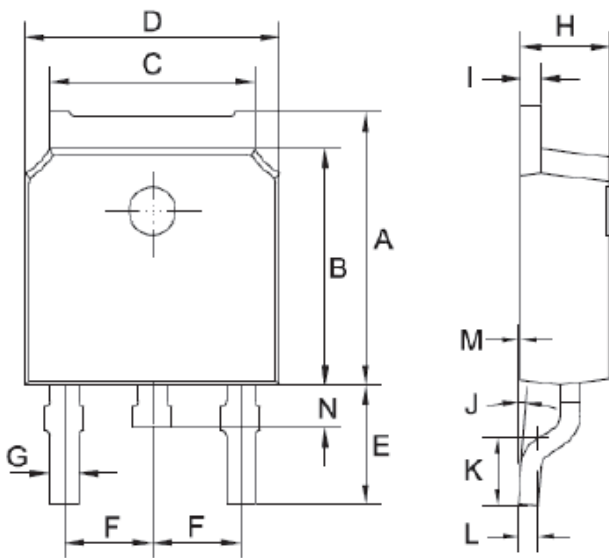
## Dimensions

### 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°	8°	0°	8°
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
N	0.6	1	0.024	0.039

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