

## FEATURES

- $R_{DS(ON)} < 0.19\Omega @ V_{GS} = 10V$
- 100% avalanche tested
- RoHS compliant

## MECHANICAL DATA

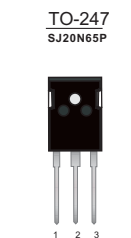
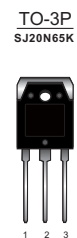
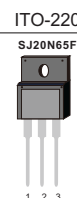
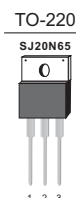
- Case: TO-220, ITO-220, TO-3P, TO-247, TO-262, TO-263 package

## Ordering Information

Part No.	Package Type	Package	Quality(box)
SJ20N65	TO-220	Tube	1000
SJ20N65F	ITO-220	Tube	1000
SJ20N65E	TO-262	Tube	1000
SJ20N65D	TO-263	Tape & Reel	800
SJ20N65K	TO-3P	Tube	360
SJ20N65P	TO-247	Tube	360

## PRODUCT SUMMARY

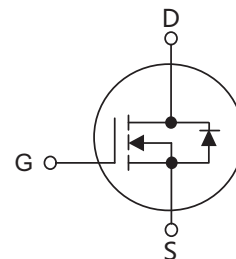
$V_{DS}(V)$	$R_{DS(on)} (\Omega)$ Typ	$I_D(A)$
650	0.17@ $V_{GS}=10V$	20



## Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source



## ABSOLUTE MAXIMUM RATINGS $(T_C=25^\circ C, \text{ unless otherwise specified})$

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	20	A
Pulsed Drain Current (Note 1)	$I_{DM}$	45	A
Avalanche Energy(Note 2)	$E_{AS}$	485	mJ
Avalanche Current(Note 1)	$I_{AR}$	3.5	A
Repetitive Avalanche Energy(Note 1)	$E_{AR}$	1	mJ
Power Dissipation	TO-220/TO-263/TO-262 TO-251/TO-252	151	W
	ITO-220	35	
Junction Temperature.	$T_J$	+150	$^\circ C$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^\circ C$

# SJ20N65 Series

## THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-3P/TO-247 TO-262/TO-263	R <sub>θJA</sub>	62	°C/W
	ITO-220		82	
Junction to Case	TO-220/TO-263/TO-262 TO-3P/TO-247	R <sub>θJC</sub>	1.2	°C/W
	ITO-220		4.1	

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise specified)

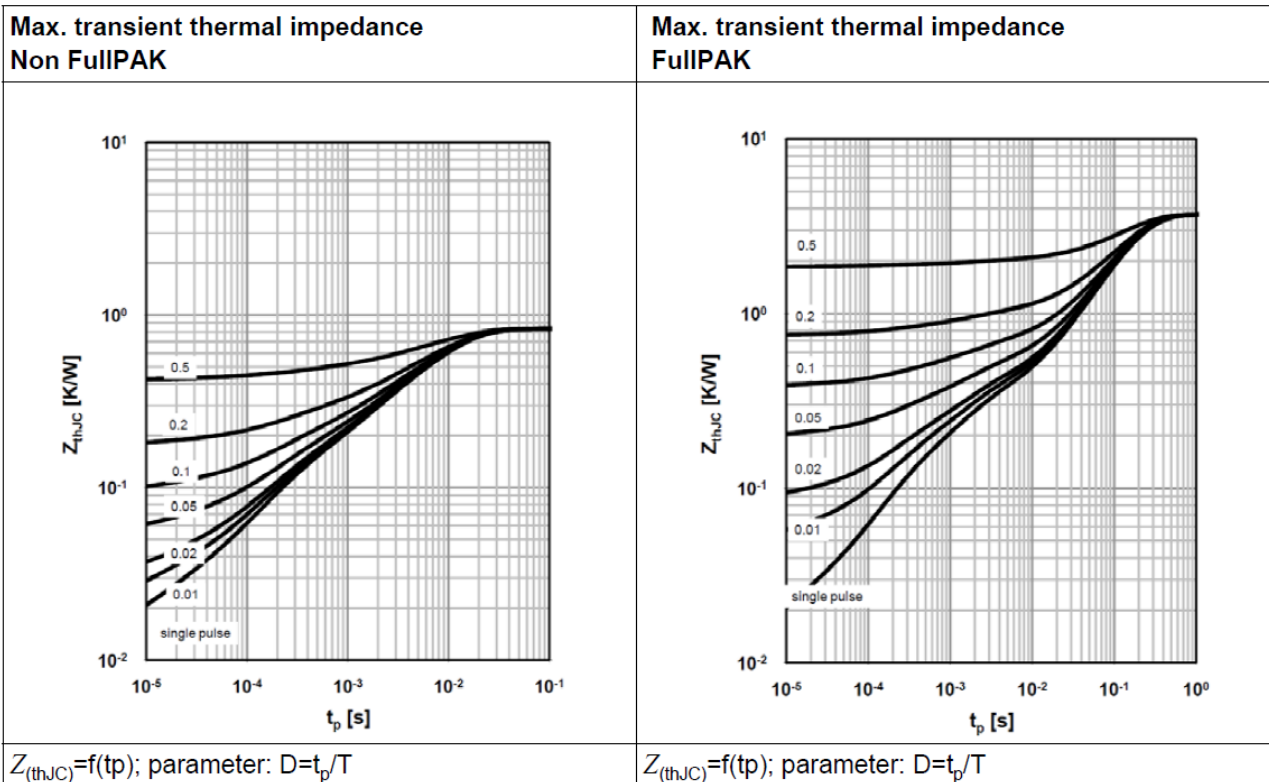
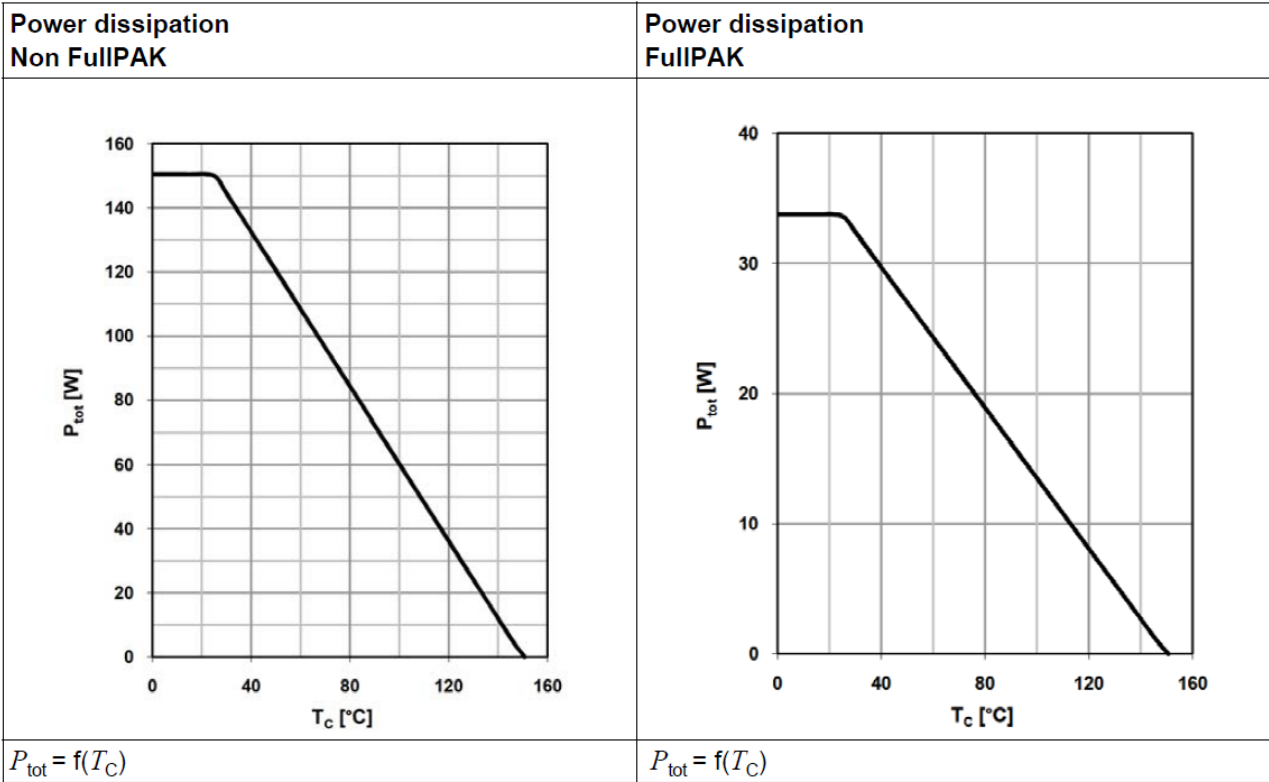
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>								
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650			V	
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V			1	μA	
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =30V, V <sub>DS</sub> =0V			100	nA	
	Reverse		V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V			-100	nA	
<b>ON CHARACTERISTICS(Note 3)</b>								
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2		4	V	
DRAIN-SOURCE ON-RESISTANCE		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A		0.17	0.19	Ω	
<b>DYNAMIC CHARACTERISTICS</b>								
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz		1510		pF	
Output Capacitance		C <sub>OSS</sub>				75		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>				6		pF
<b>SWITCHING CHARACTERISTICS</b>								
Turn-On Delay Time		t <sub>D(ON)</sub>	V <sub>DD</sub> =520V, I <sub>D</sub> =10A, R <sub>G</sub> =20Ω		25		ns	
Turn-On Rise Time		t <sub>r</sub>				17		ns
Turn-Off Delay Time		t <sub>D(OFF)</sub>				130		ns
Turn-Off Fall Time		t <sub>f</sub>				11		ns
Total Gate Charge		Q <sub>G</sub>				90	120	nC
Gate-Source Charge		Q <sub>GS</sub>	V <sub>DS</sub> =520V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V		8.5		nC	
Gate-Drain Charge		Q <sub>GD</sub>			13		nC	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>								
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A		0.9	1.5	V	
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>				20	A	
Reverse Recovery Time		t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A		475		ns	
Reverse Recovery Charge		Q <sub>RR</sub>	dI <sub>F</sub> /dt=100A/μs (Note 1)		5.8		μC	

Note:1. Repetitive Rating : Pulse width limited by maximum junction temperature

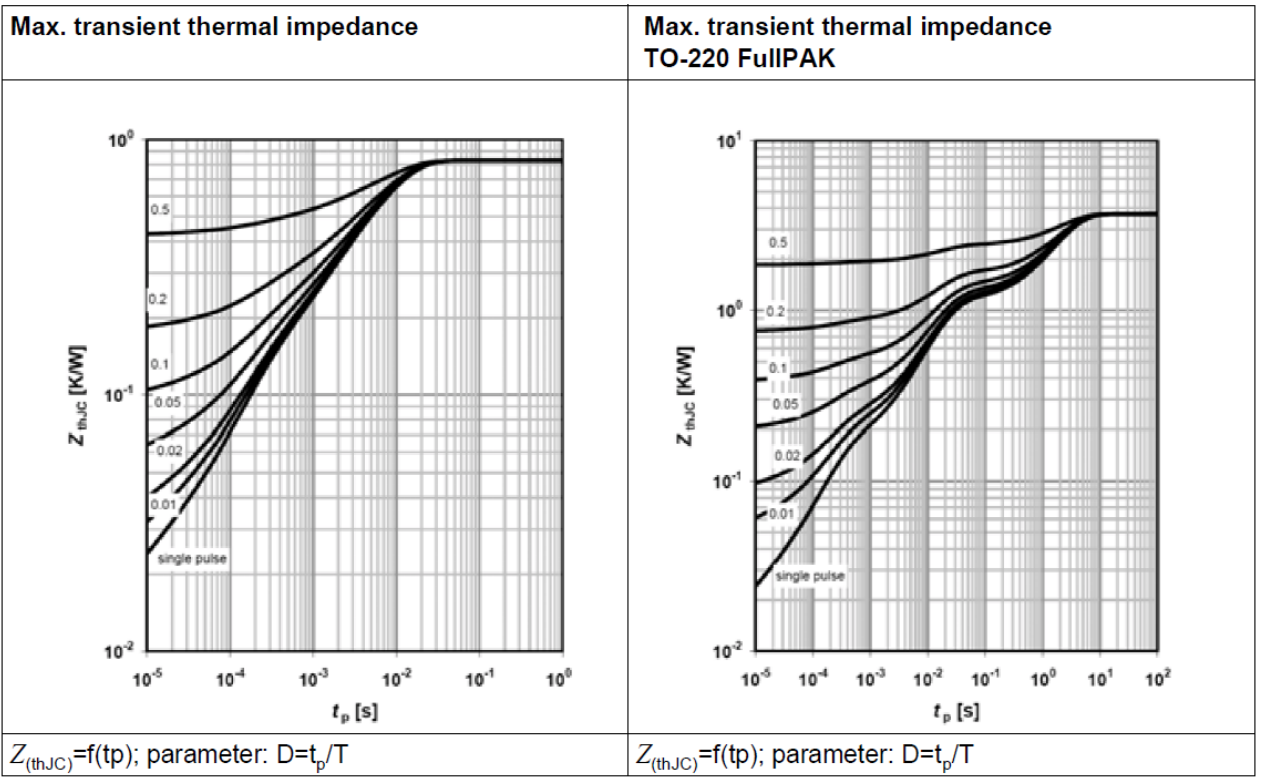
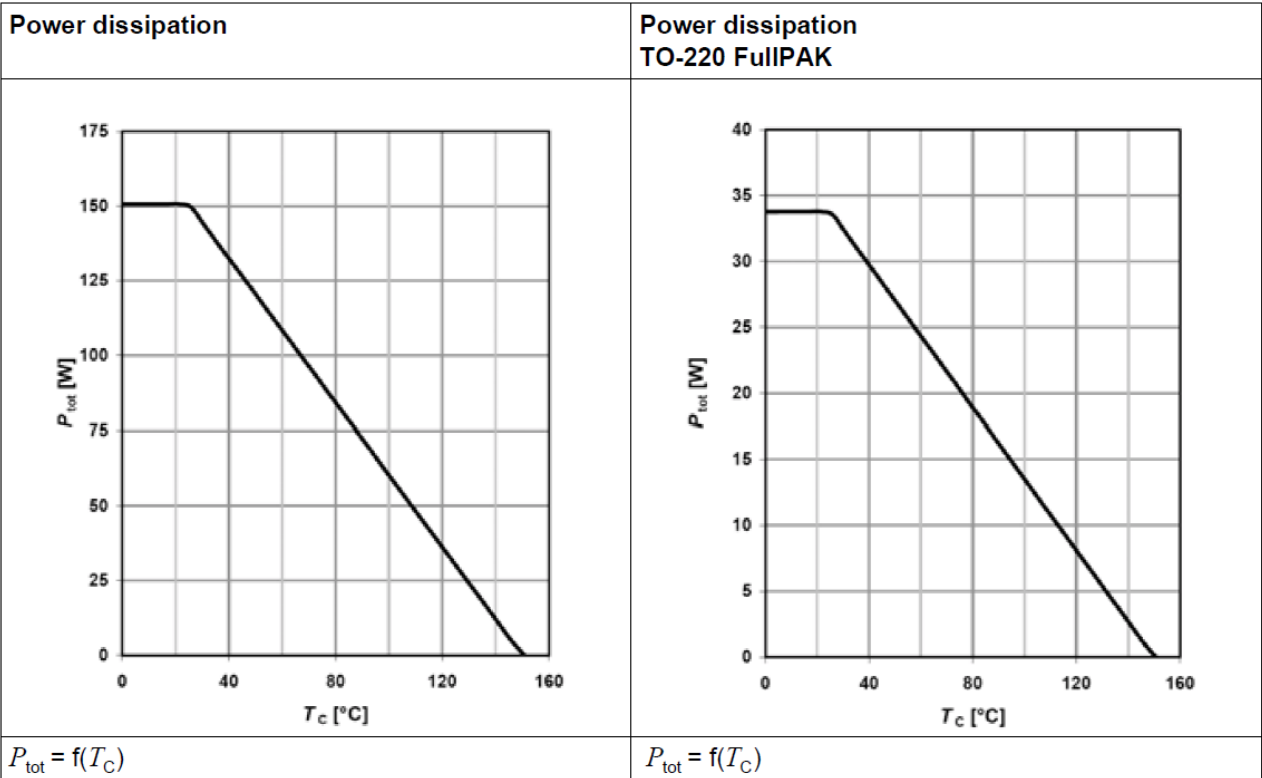
2. L=60mH, I<sub>AS</sub>=3A, V<sub>DD</sub>=150V, Starting T<sub>J</sub>=25 C

3. Pulse Test: Pulse width ≤300μs, Duty cycle≤1%.

Typical characteristics Diagrams

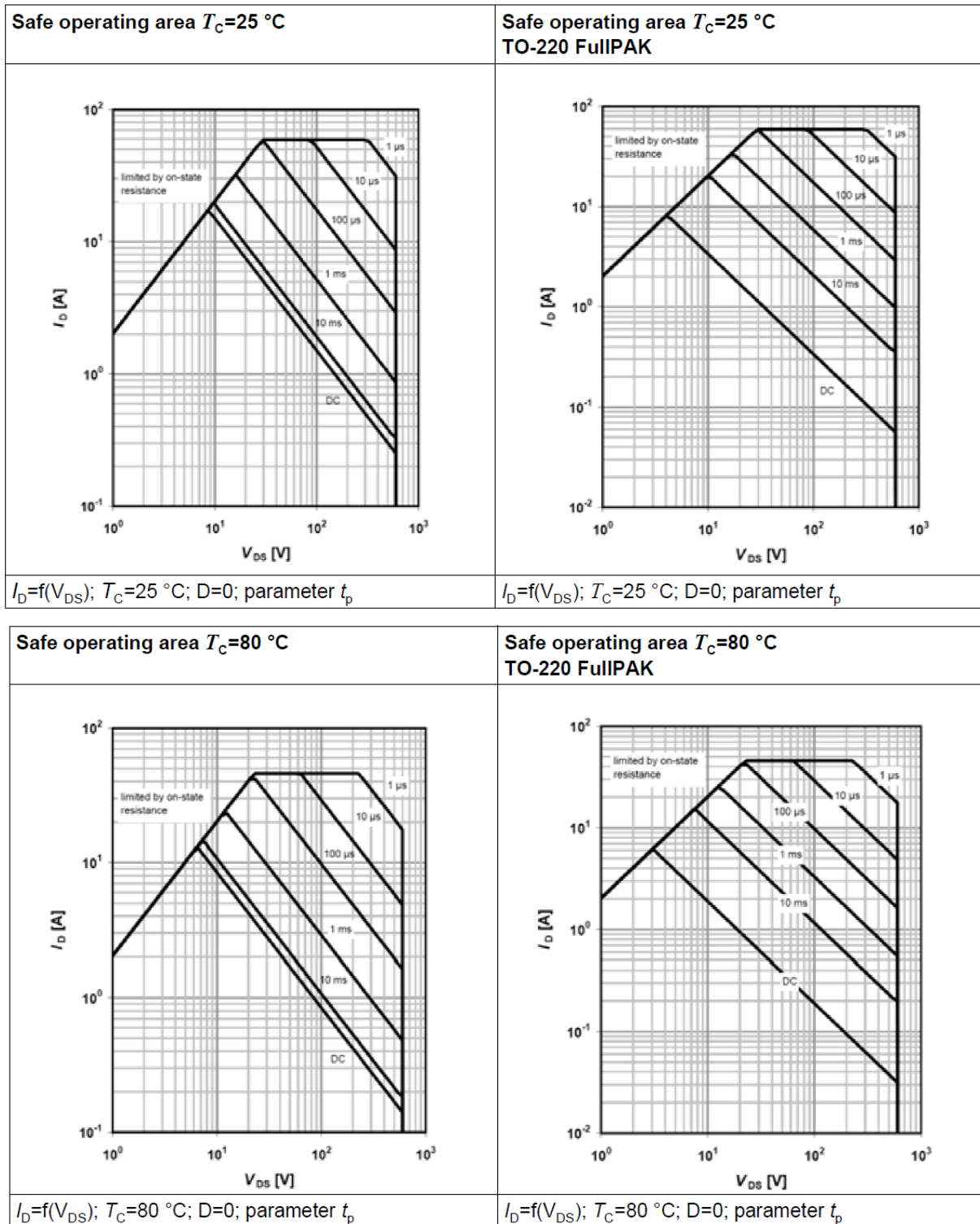


Typical characteristics Diagrams

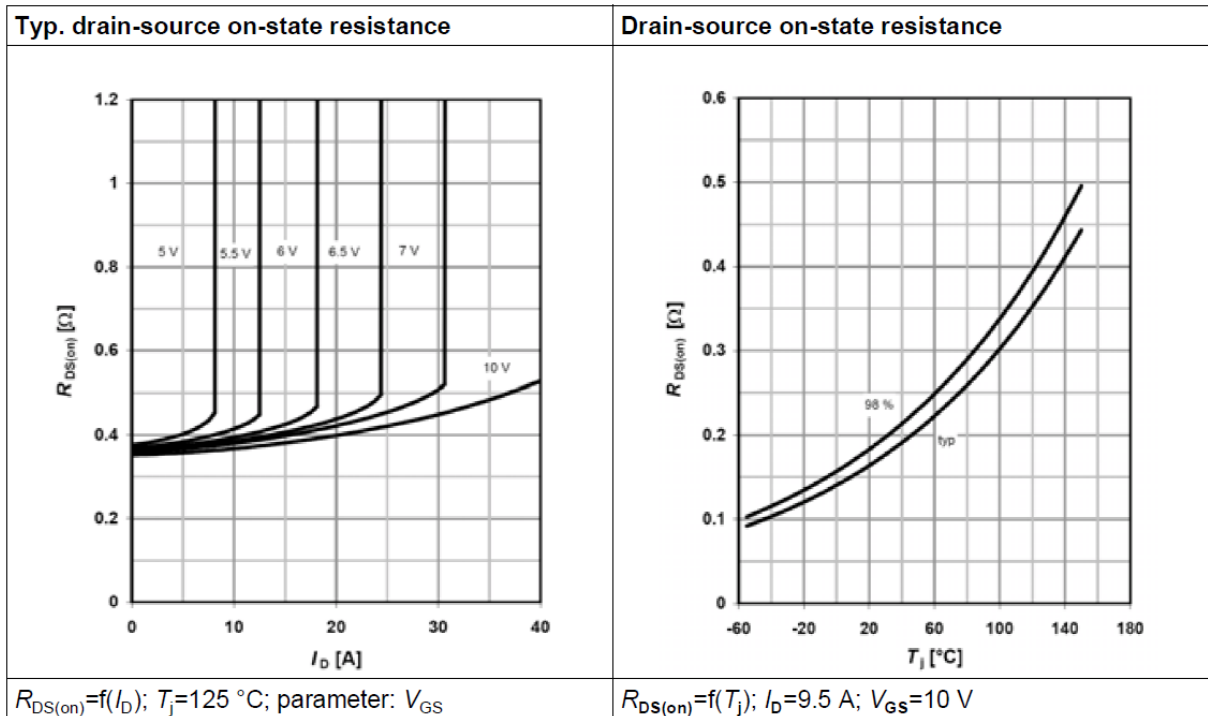
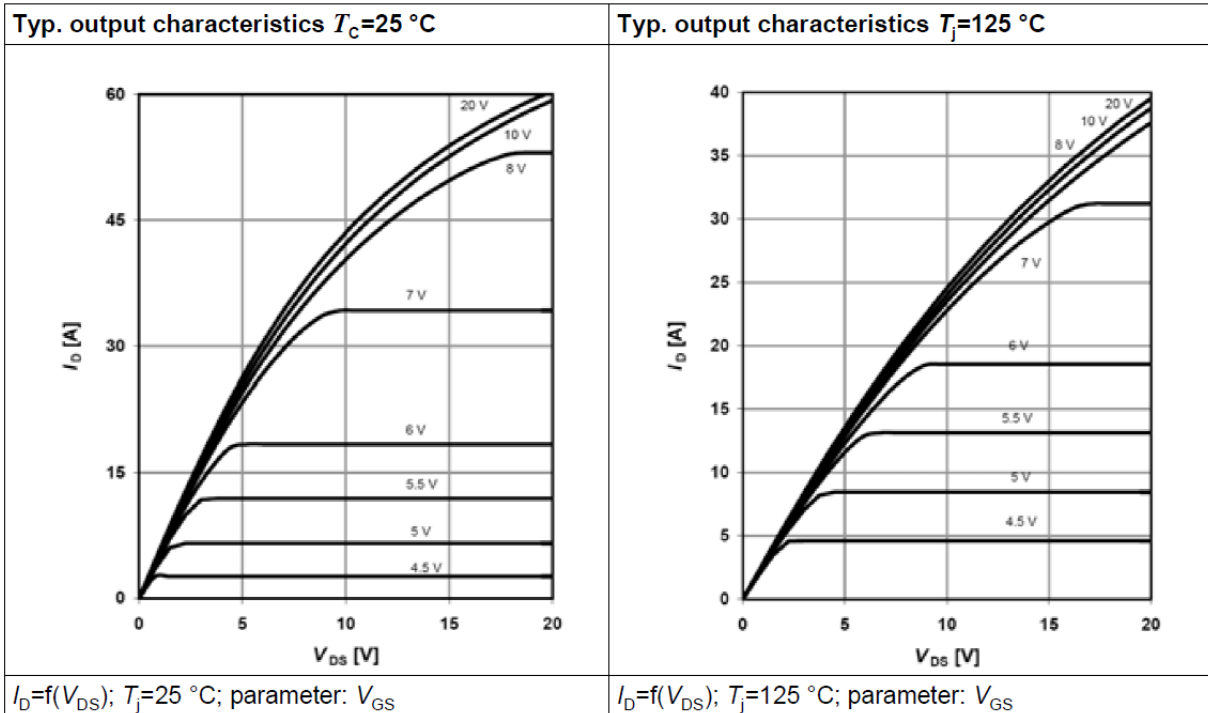


# SJ20N65 Series

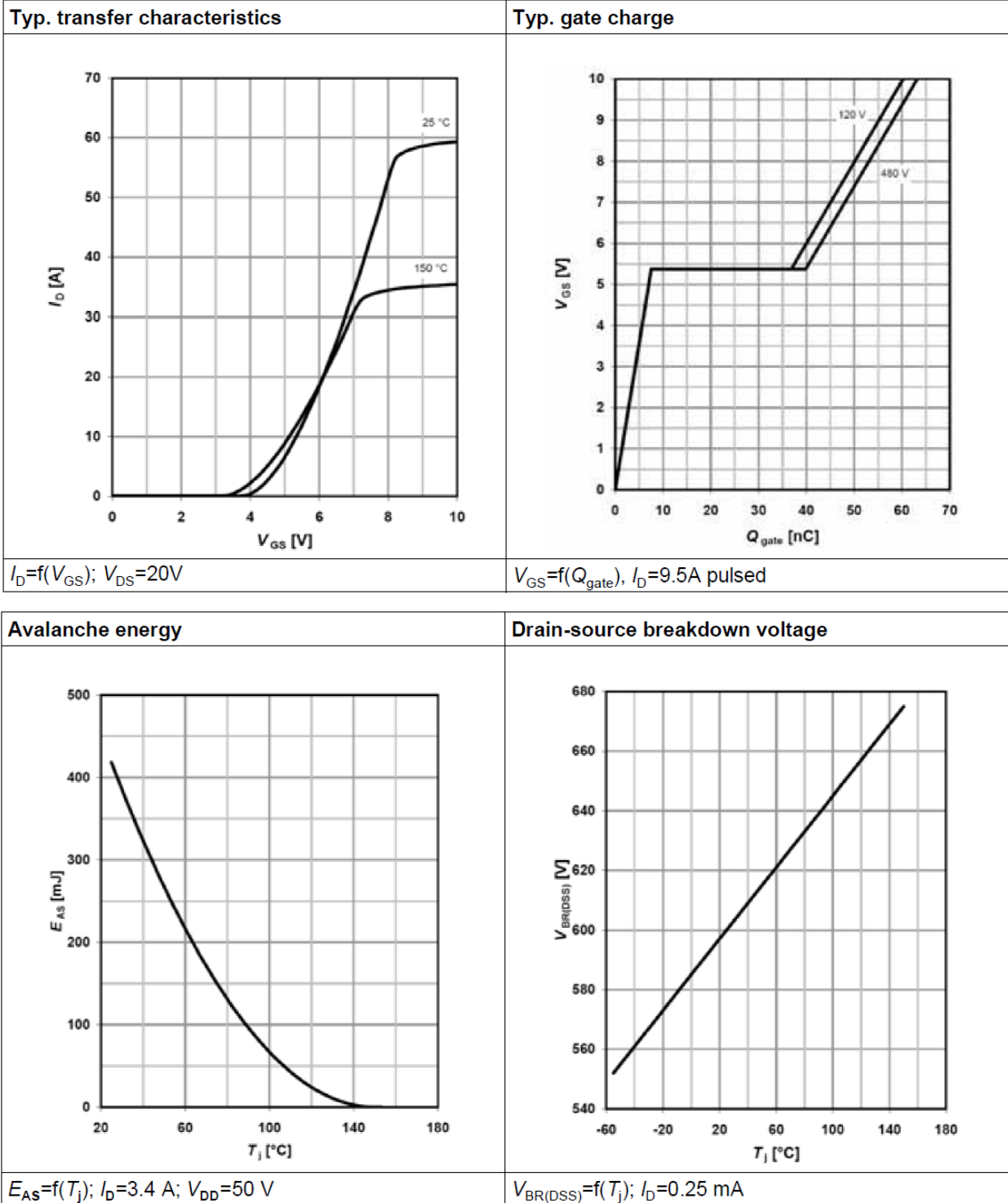
## Typical characteristics Diagrams



Typical characteristics Diagrams



Typical characteristics Diagrams



TYPICAL TEST CIRCUIT

Table 20 Switching times test circuit and waveform for inductive load

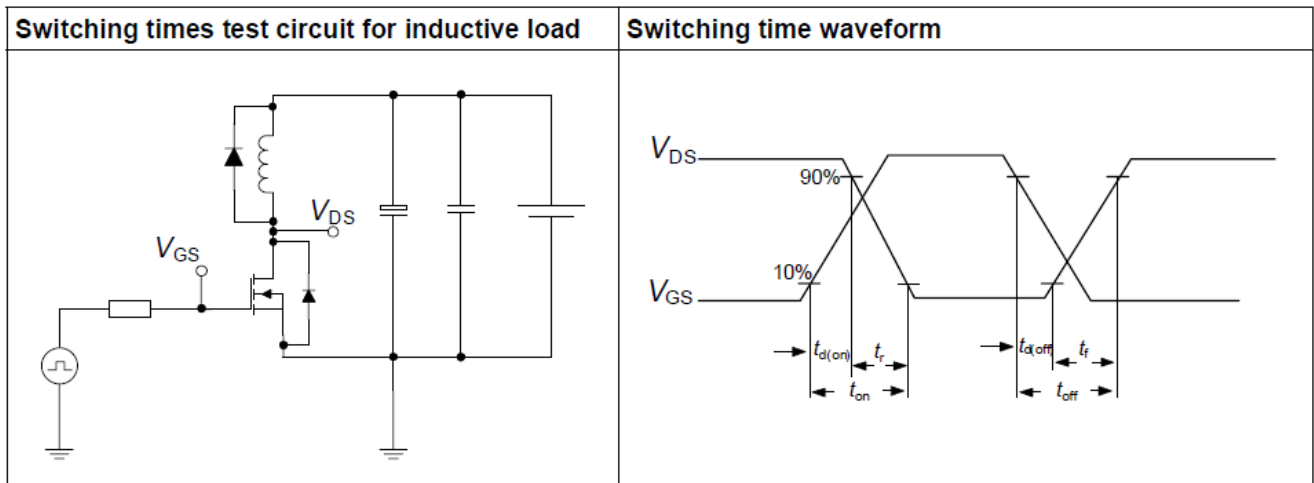


Table 21 Unclamped inductive load test circuit and waveform

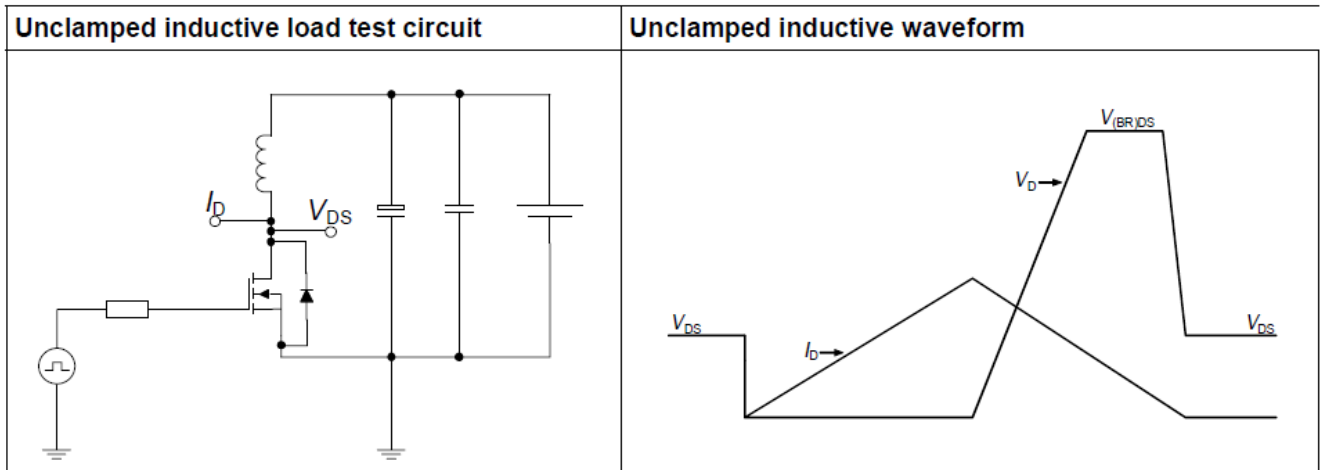
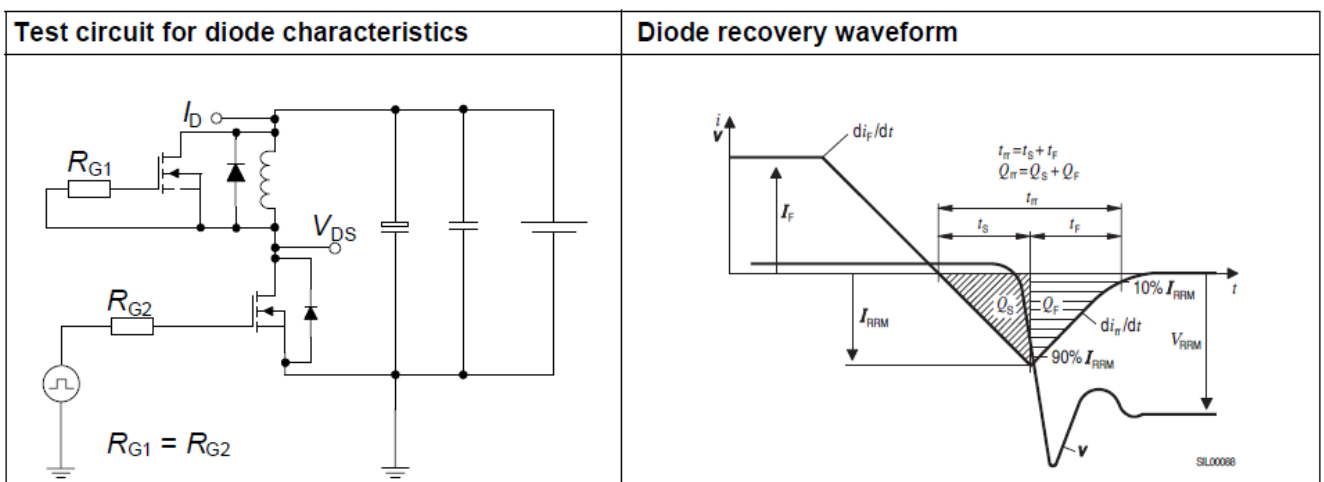
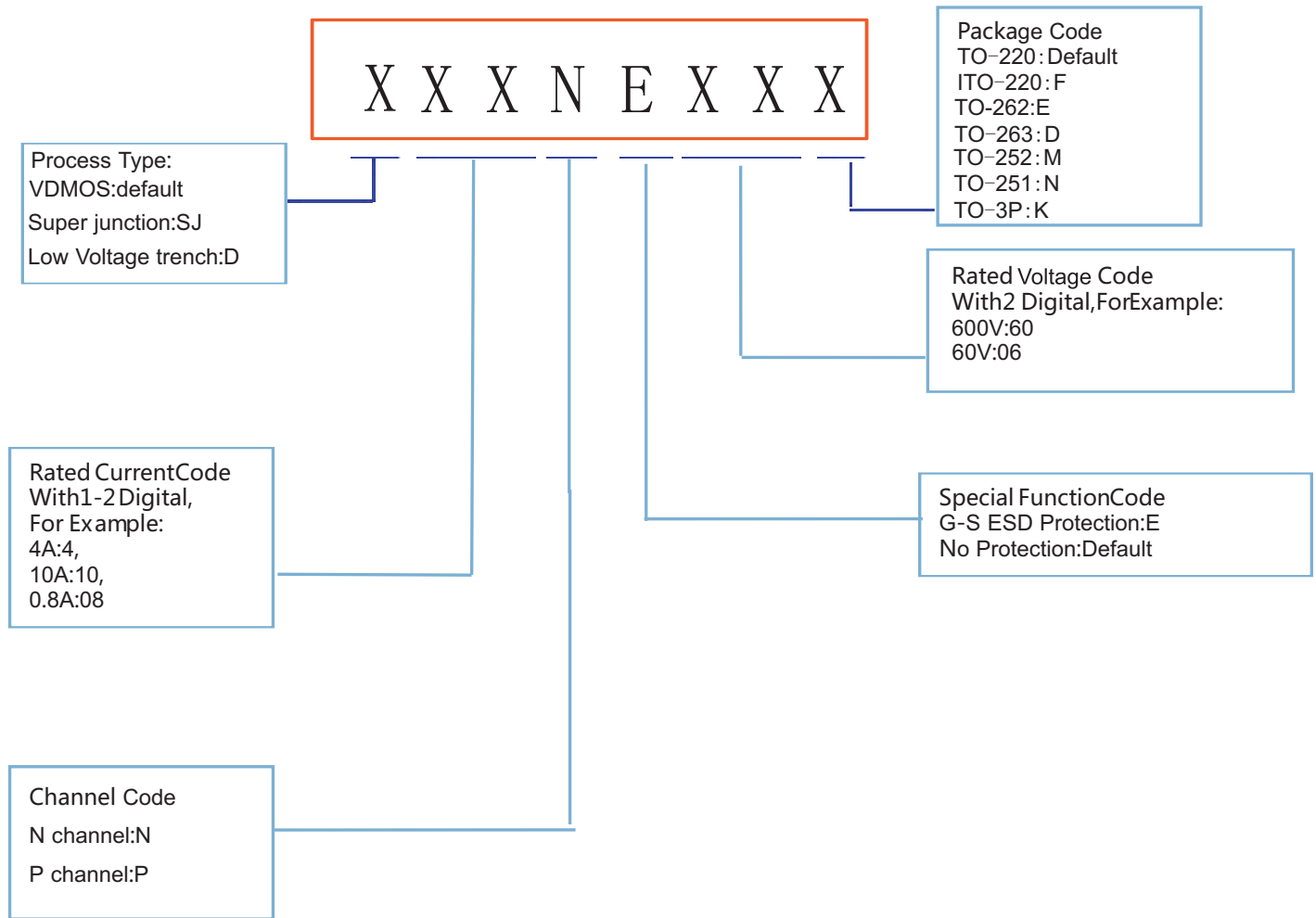


Table 22 Test circuit and waveform for diode characteristics





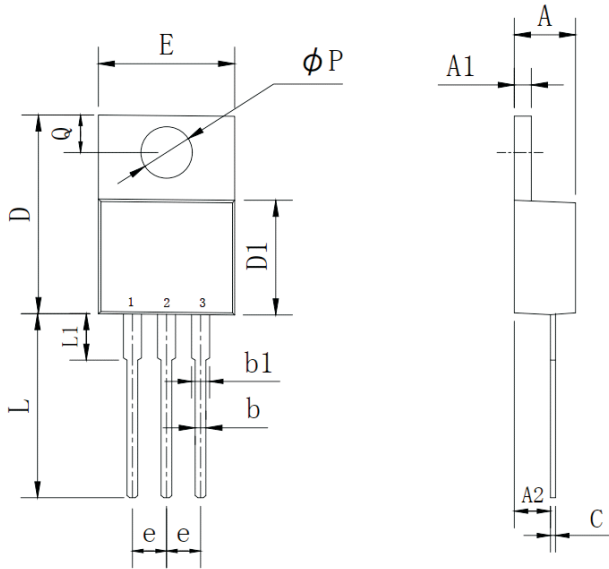
Product Names Rules



# SJ20N65 Series

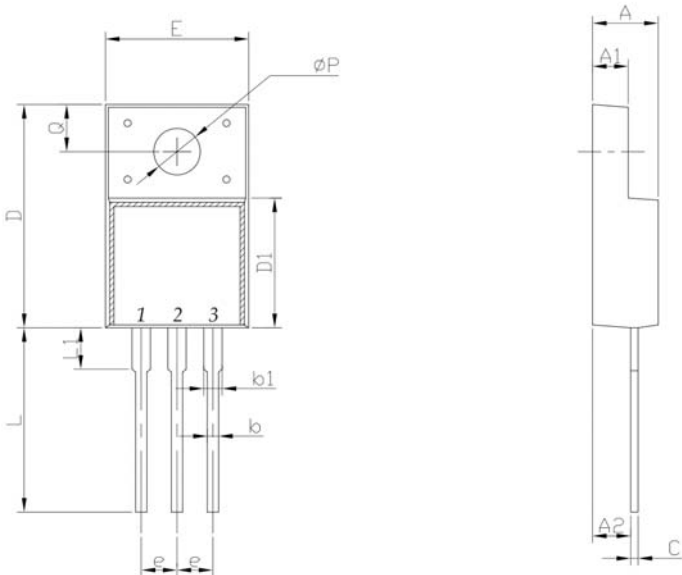
## Dimensions

### 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

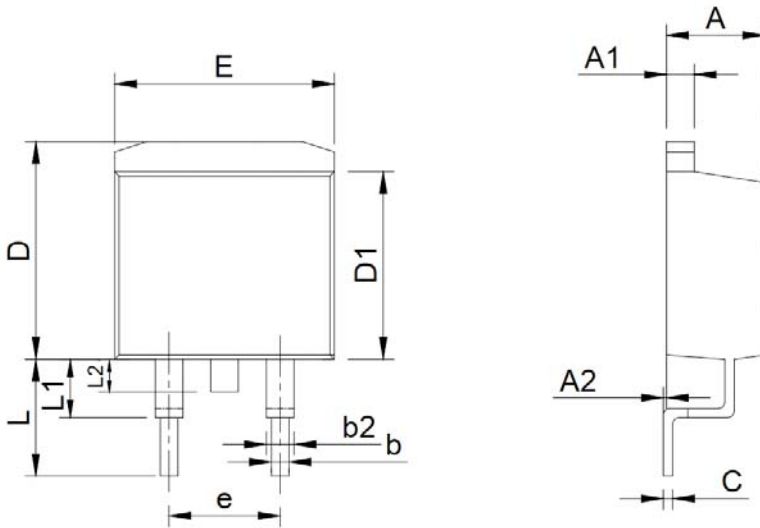


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108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

# SJ20N65 Series

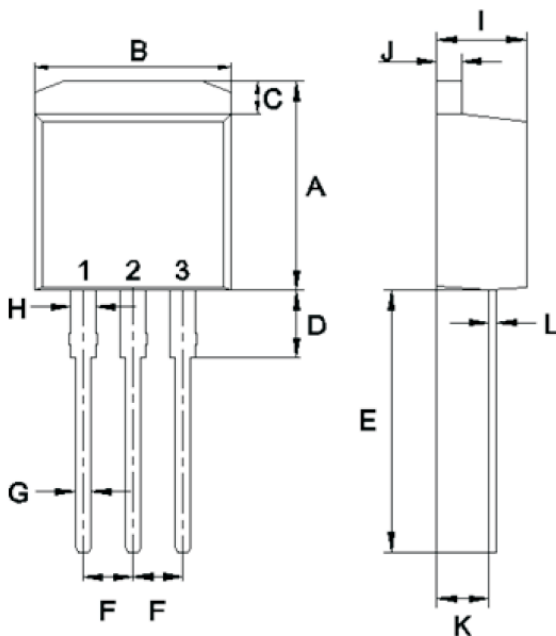
## Dimensions

### 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

### TO-262 PACKAGE OUTLINE DIMENSIONS

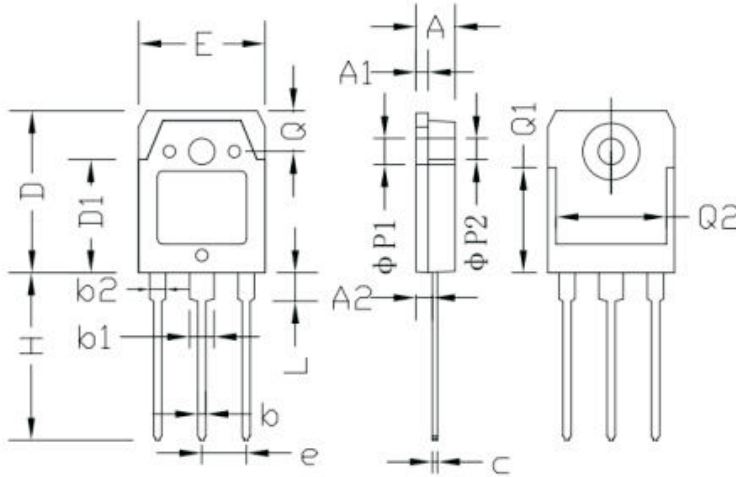


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	10.14	11.14	0.399	0.439
B	9.57	10.57	0.377	0.416
C	1.15	1.84	0.045	0.072
D	2.95	3.95	0.116	0.156
E	12.25	13.75	0.482	0.541
F	2.34	2.74	0.092	0.108
G	0.51	1.11	0.020	0.044
H	0.97	1.57	0.038	0.062
I	4.25	4.87	0.167	0.192
J	1.07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

# SJ20N65 Series

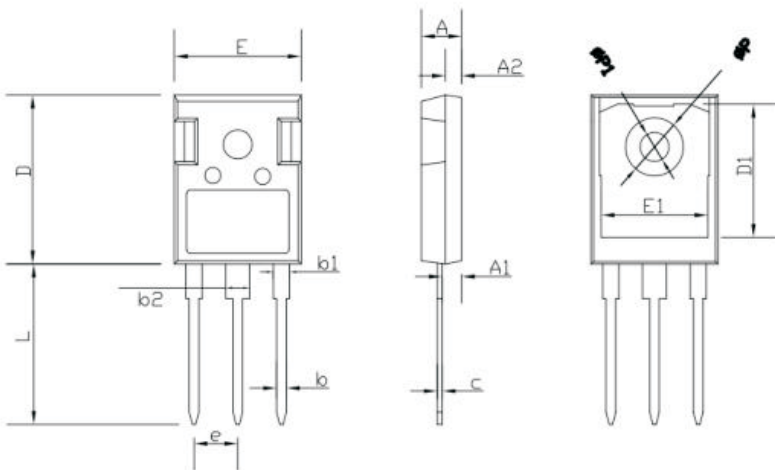
## Dimensions

### 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

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