Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
200V	49mΩ@10V	45A

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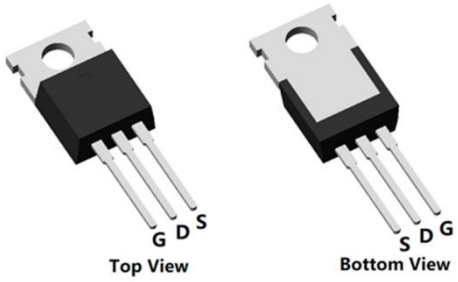
Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

Applications

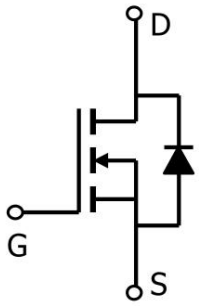
- DC-DC Converter
- Ideal for high-frequency switching and synchronous rectification

Package

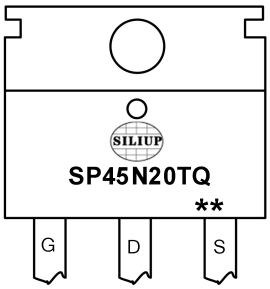


TO-220-3L(1:G 2:D 3:S)

Circuit diagram



Marking



SP45N20TQ :Device Code
**** :Week Code**

Order Information

Device	Package	Unit/Tape
SP45N20TQ	TO-220-3L	50

Absolute maximum ratings (Ta=25℃,unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current (T_C=25℃)	I_D	45	A
Continuous Drain Current (T_C=100℃)	I_D	28	A
Pulsed Drain Current	I_{DM}	180	A
Single Pulse Avalanche Energy[1]	E_{AS}	1080	mJ
Power Dissipation (T_C=25℃)	P_D	221	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.56	℃/W
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃

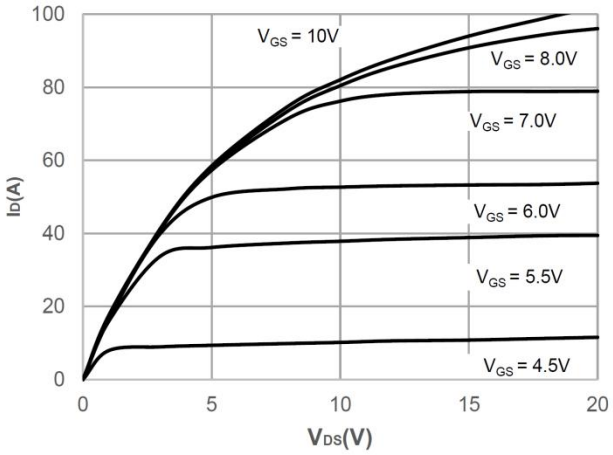
Electrical characteristics (Ta=25℃, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	VGS=0V , ID=250uA	200	-	-	V
Drain-Source Leakage Current	I_{DSS}	VDS=160V , VGS=0V , TJ=25℃	-	-	1	uA
Gate-Source Leakage Current	I_{GSS}	VGS=±30V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	VGS=VDS , ID =250uA	2	3	4	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	VGS=10V , ID=20A	-	49	64	mΩ
Dynamic characteristics						
Input Capacitance	C_{iss}	VDS=100V , VGS=0V , f=1MHz	-	2680	-	pF
Output Capacitance	C_{oss}		-	207	-	
Reverse Transfer Capacitance	C_{rss}		-	33	-	
Total Gate Charge	Q_g	VDS=100V , VGS=10V , ID=20A	-	61	-	nC
Gate-Source Charge	Q_{gs}		-	17	-	
Gate-Drain Charge	Q_{gd}		-	24	-	
Switching Characteristics						
Turn-On Delay Time	$T_{d(on)}$	VDD=100V VGS=10V , RG=10Ω, ID=20A	-	33	-	nS
Rise Time	T_r		-	120	-	
Turn-Off Delay Time	$T_{d(off)}$		-	141	-	
Fall Time	T_f		-	106	-	
Diode Characteristics						
Diode Forward Voltage	V_{SD}	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I_S		-	-	45	A
Reverse Recovery Time	T_{rr}	I_S=20A, di/dt=100A/us, TJ=25℃	-	162	-	nS
Reverse Recovery Charge	Q_{rr}		-	1142	-	nC

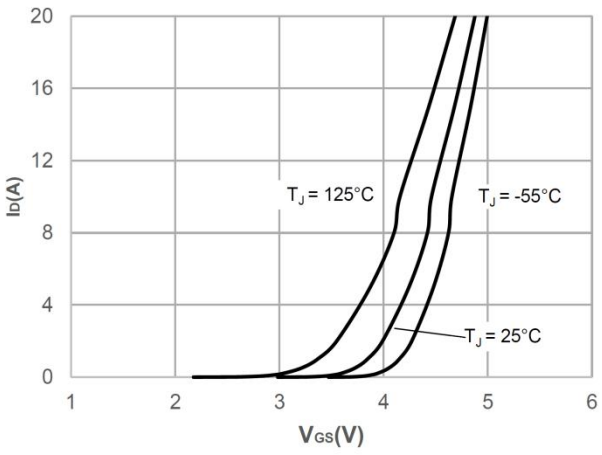
Note :

1. The EAS test condition is VDD=75V,VGS=10V,L=0.5mH,RG=25mΩ

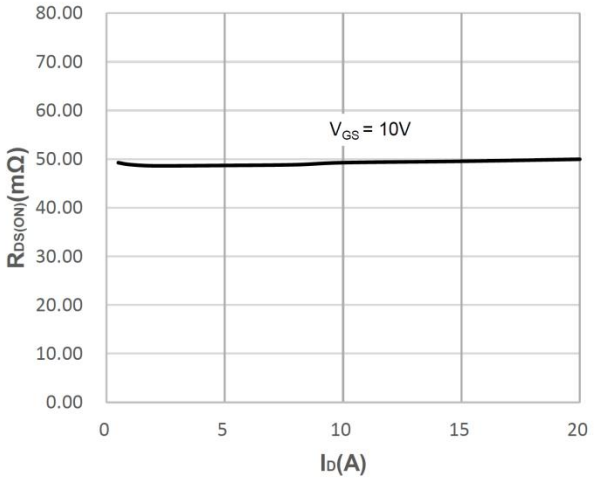
Typical Characteristics



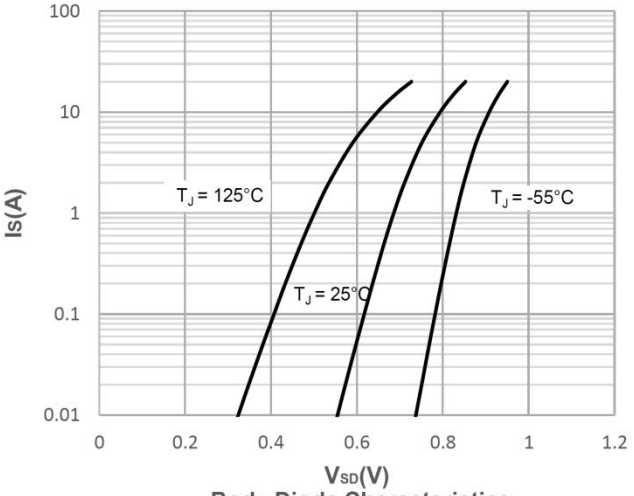
Output Characteristics



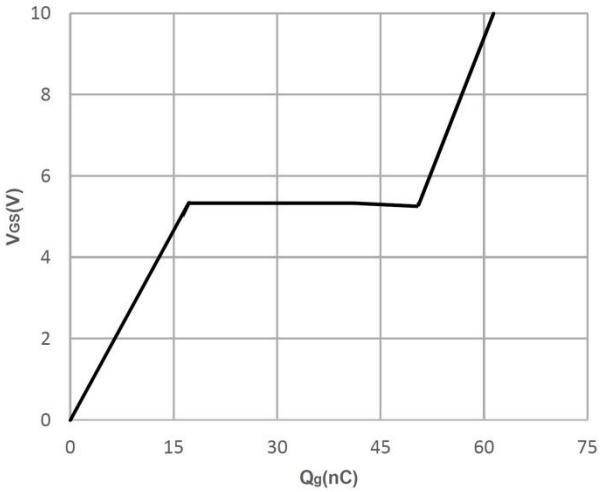
Typical Transfer Characteristics



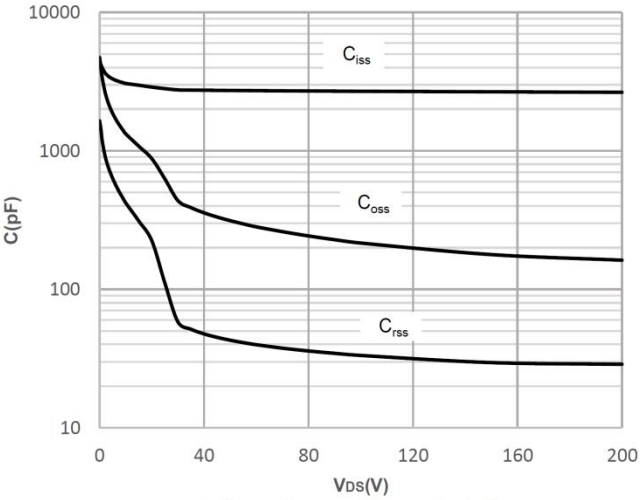
On-resistance vs. Drain Current



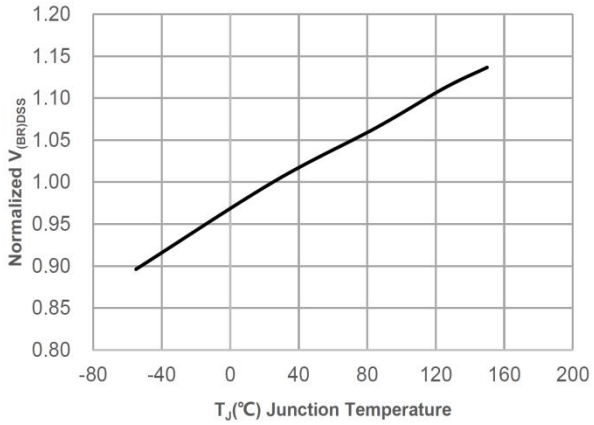
Body Diode Characteristics



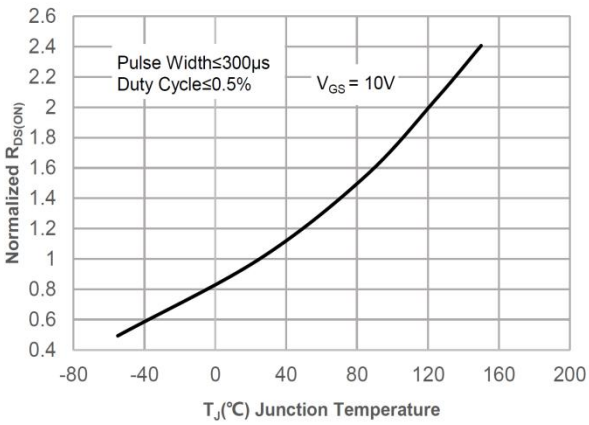
Gate Charge Characteristics



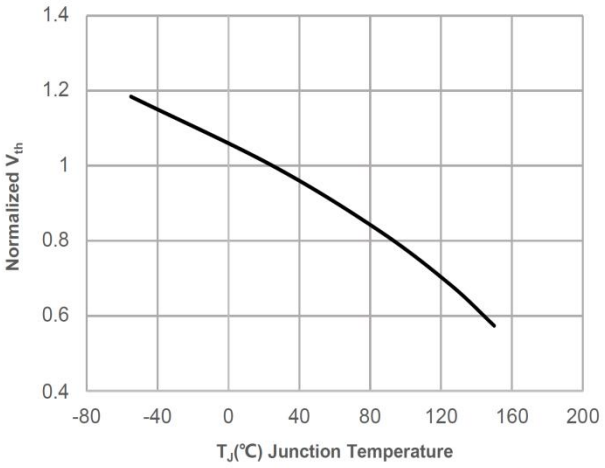
Capacitance Characteristics



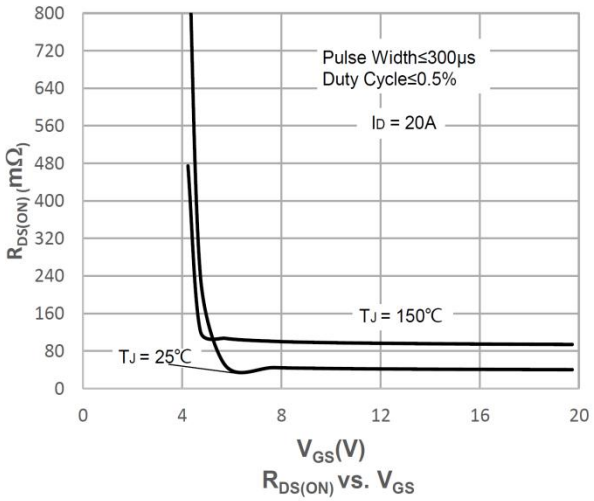
Normalized Breakdown voltage vs. Junction Temperature



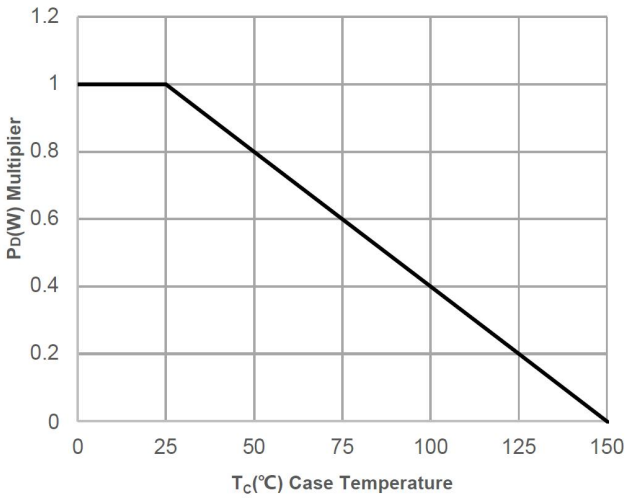
Normalized on Resistance vs. Junction Temperature



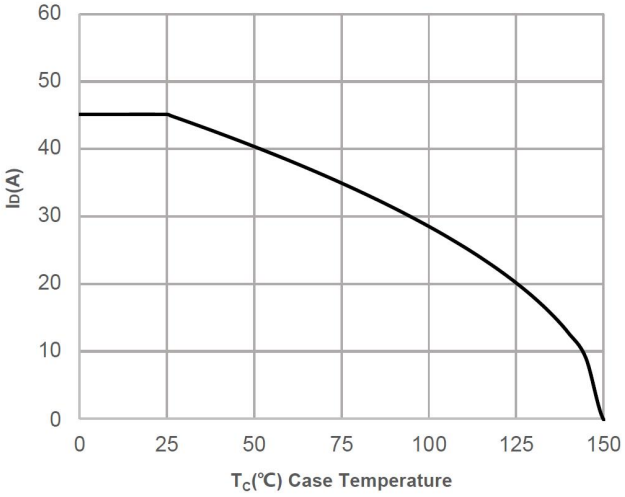
Normalized Threshold Voltage vs. Junction Temperature



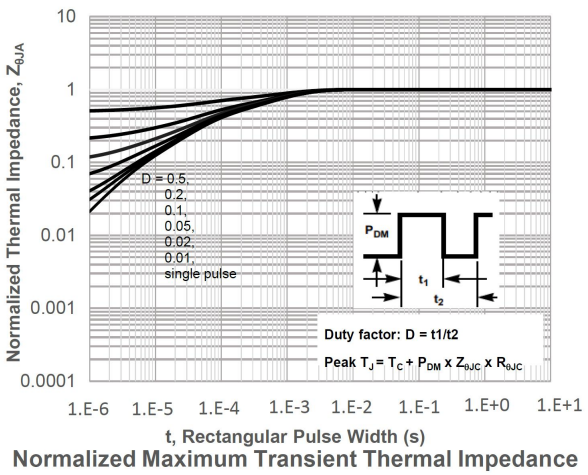
$R_{DS(ON)}$ vs. V_{GS}



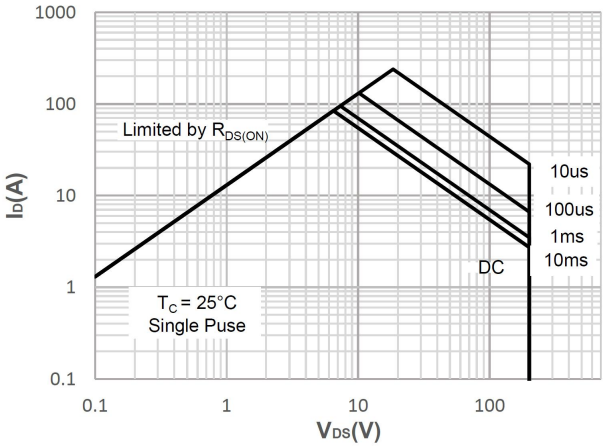
Power De-rating



Current De-rating

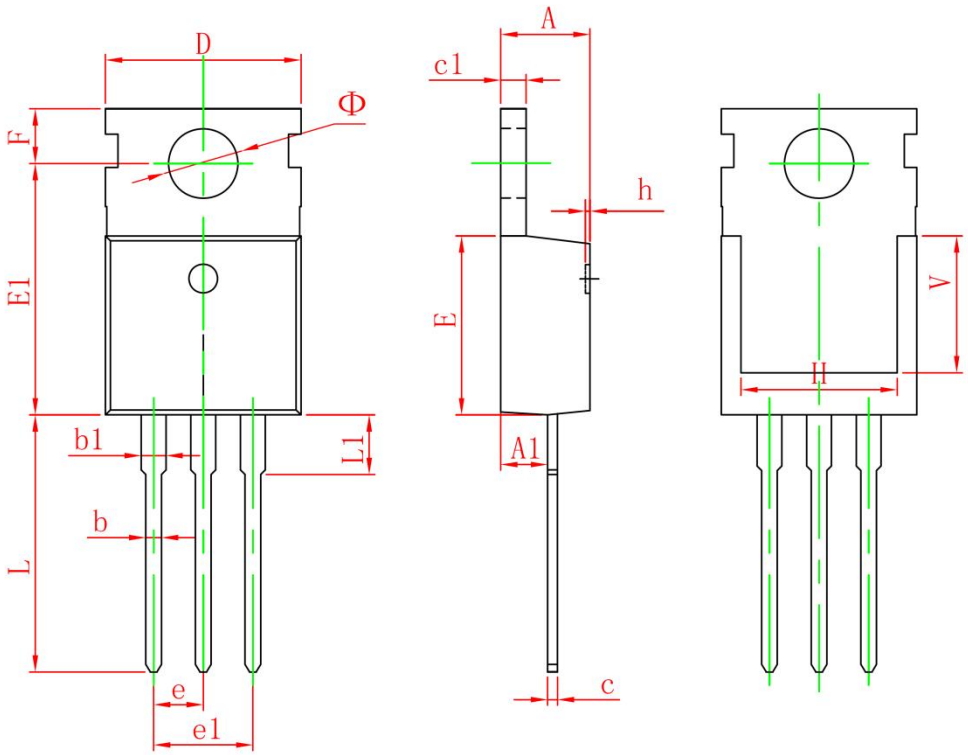


Normalized Maximum Transient Thermal Impedance



Maximum Safe Operating Area

TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150