

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
1200V	35mΩ@18V	50A



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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Feature

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to Parallel
- Simple to Drive
- RoHS Compliant

Applications

- Power Factor Correction Modules
- Switch Mode Power Supplies
- Photovoltaic Inverter
- UPS Power Supply
- High Voltage DC/DC Converter

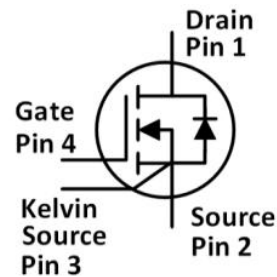
Package



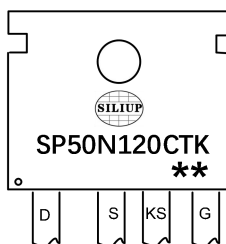
TO-247-4L

(1-Drain; 2-Source; 3Kelvin Source;4-Gate)

Circuit diagram



Marking



SP50N120CTK
**

:Device Code
:Week Code

Order Information

Device	Package	Unit/Tube
SP50N120CTK	TO-247-4L	30

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	1200	V
Gate-Source Voltage	$V_{GS\text{MAX}}$	-8/+22	V
Recommend Gate-Source Voltage	V_{GSop}	-4/+18	V
Continuous Drain Current(Tc=25°C)	I_D	74	A
Continuous Drain Current(Tc=100°C)	I_D	50	A
Pulsed Drain Current	I_{DM}	150	A
Single Pulse Avalanche Energy ¹	E_{AS}	1805	mJ
Power Dissipation(Tc=25°C)	P_D	312	W
Power Dissipation(Tc=100°C)	P_D	156	W
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.51	°C/W
Storage Temperature Range	T_{STG}	-55 to 175	°C
Operating Junction Temperature Range	T_J	-55 to 175	°C

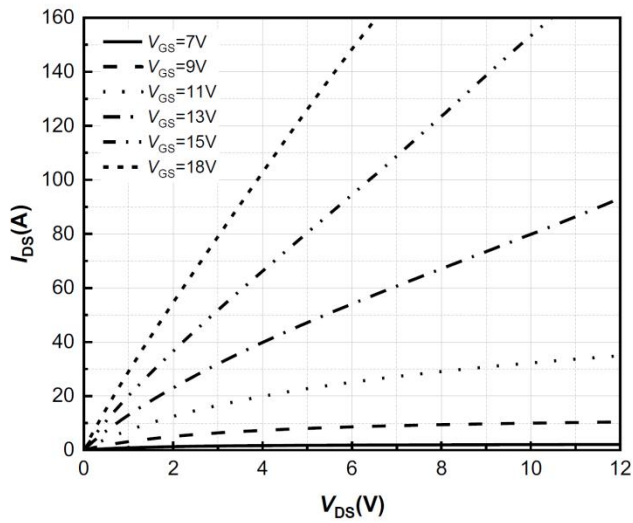
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	1200	-	-	V
Drain-Source Leakage Current	IDSS	VDS=1200V, VGS=0V, TJ=25℃	-	1	100	uA
Gate-Source Leakage Current	IGSS	VGS=18V , VDS=0V, TJ=25℃	-	1	100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID =5mA, TJ=25℃	2.0	2.5	4.0	V
		VGS=VDS , ID =5mA, TJ=175℃	-	1.8	-	
Static Drain-Source On-Resistance	RDS(ON)	VGS=18V , ID=20A, TJ=25℃	-	35	45	mΩ
		VGS=18V , ID=20A, TJ=175℃	-	69	-	
Dynamic characteristics						
Input Capacitance	Ciss	VDS=1000V , VGS=0V , f=100KHz	-	2975	-	pF
Output Capacitance	Coss		-	119	-	
Reverse Transfer Capacitance	Crss		-	12	-	
Total Gate Charge	Qg	VDS=800V , VGS= -4/+18V , ID=40A	-	117	-	nC
Gate-Source Charge	Qgs		-	38	-	
Gate-Drain Charge	Qgd		-	27	-	
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDS=800V , VGS= -4/+18V , ID=40A RG=4.5Ω	-	18	-	ns
Rise Time	Tr		-	21	-	
Turn-Off Delay Time	Td(off)		-	31	-	
Fall Time	Tf		-	9	-	
Turn-On Energy	Eon		-	485	-	μJ
Turn-Off Energy	Eoff		-	75	-	
Total Switching Loss	Etot		-	253	-	
Reverse Diode Characteristics						
Diode Forward Voltage	VSD	VGS=-4V , ISD=20A , TJ=25℃	-	5	-	V
		VGS=-4V , ISD=20A , TJ=175℃	-	4.4	-	
Continuous Diode Forward Current	IS	VGS=-4V, Tc=25℃	-	45	-	A
		VGS=-4V, Tc=100℃	-	25	-	
Reverse Recovery Time	trr	VGS=-4V, ISD=20A,	-	19	-	ns
Reverse Recovery Charge	Qrr	VR=800V,	-	500	-	nC
Peak Reverse Recovery Current	Irrm	di/dt=3900A/us	-	50	-	A

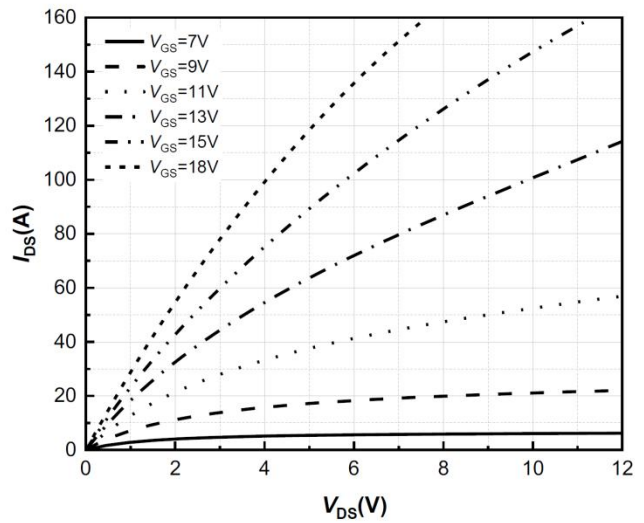
Note :

The test condition is $V_{DD}=50V, V_{GS}=10V, L=10mH, R_G=25\Omega$

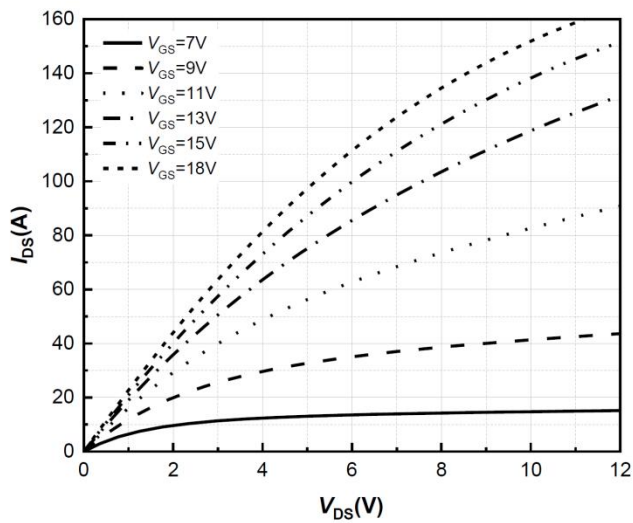
Typical Characteristics



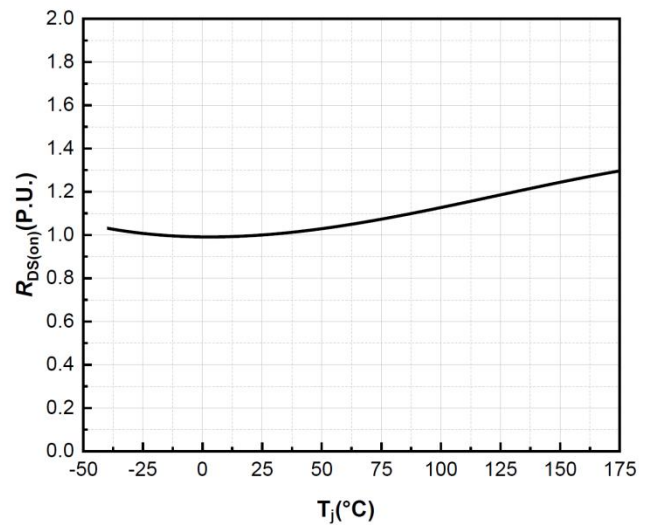
Output Characteristics $T_j = -40^\circ\text{C}$



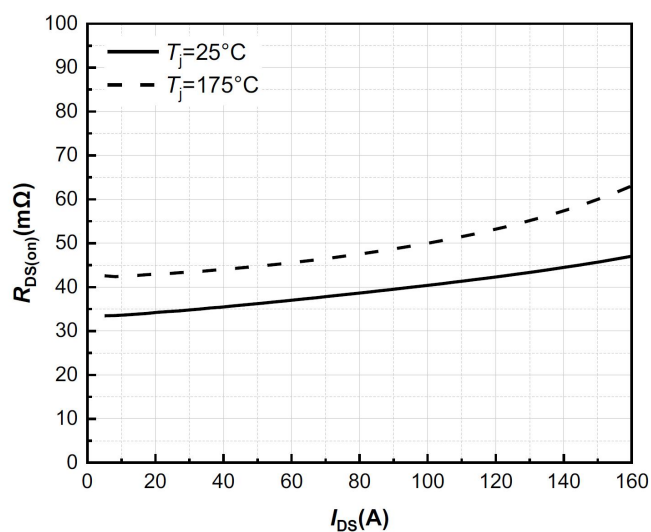
Output Characteristics $T_j = 25^\circ\text{C}$



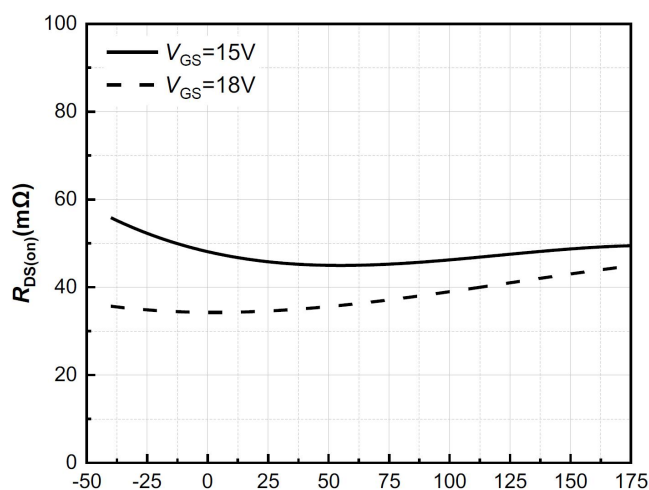
Output Characteristics $T_j = 175^\circ\text{C}$



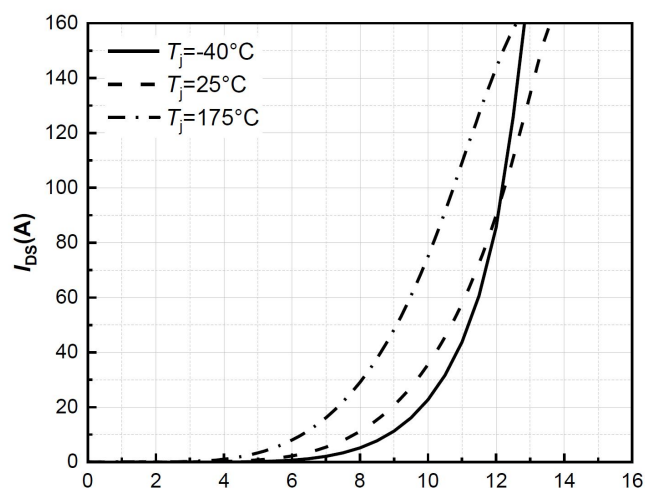
Normalized On-Resistance vs. Temperature



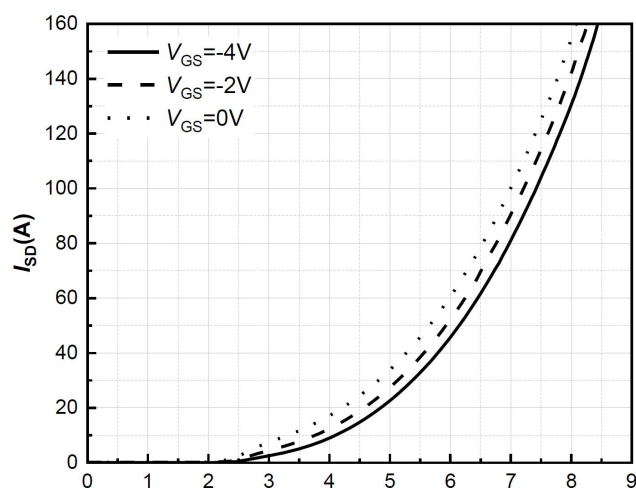
On-Resistance vs. Drain Current For Various Temperatures



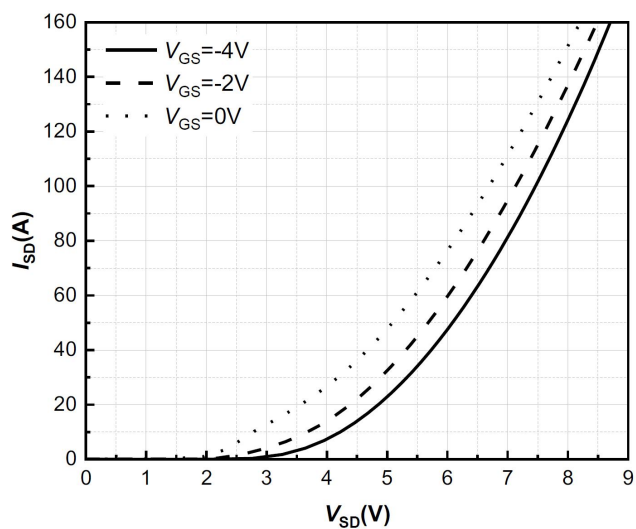
On-Resistance vs. Temperature For Various Gate Voltage



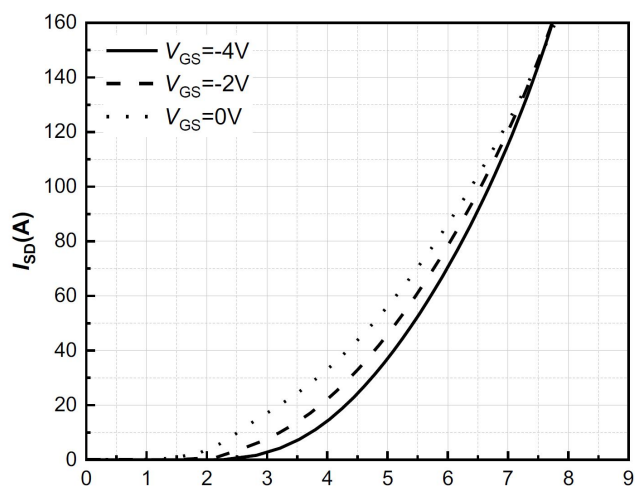
Transfer Characteristic for Various Junction Temperatures $V_{DS}=20\text{V}$



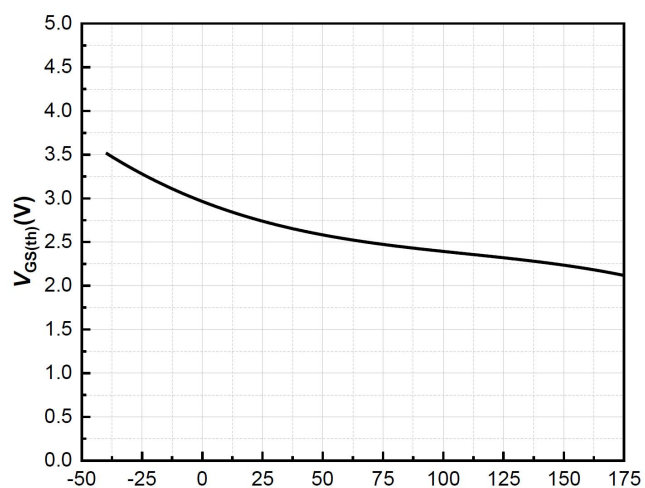
Body Diode Characteristic $T_j = -40^\circ\text{C}$



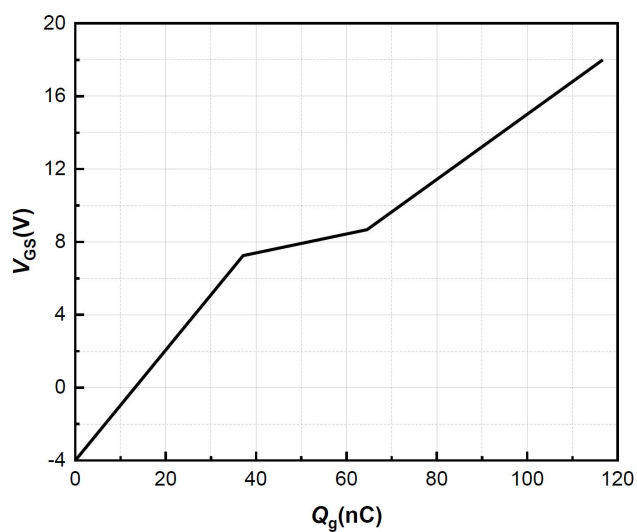
Body Diode Characteristic $T_j=25^{\circ}\text{C}$



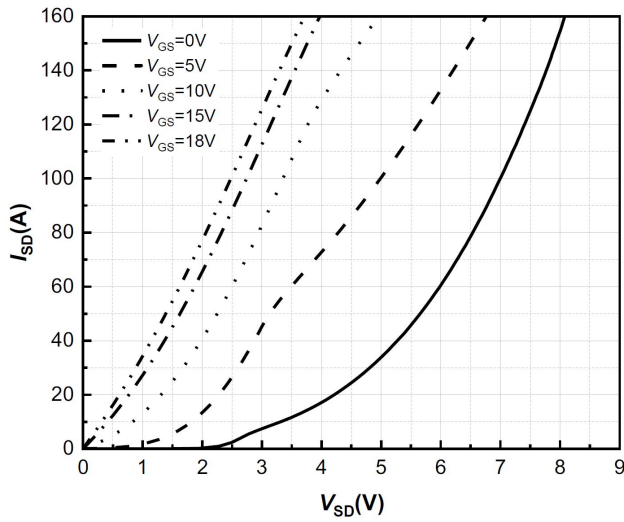
Body Diode Characteristic $T_j=175^{\circ}\text{C}$



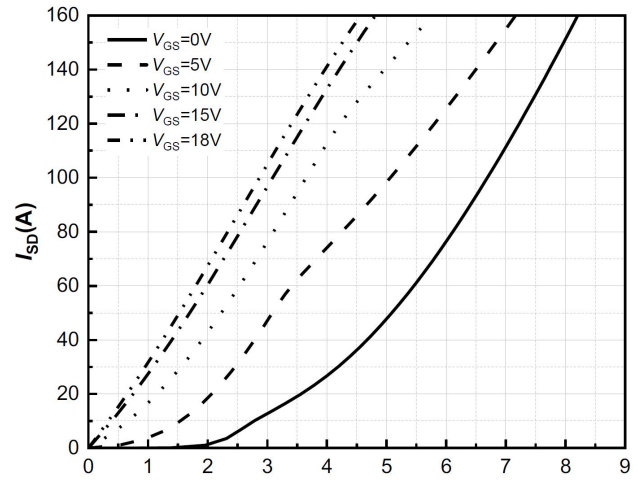
Threshold Voltage vs. Temperature



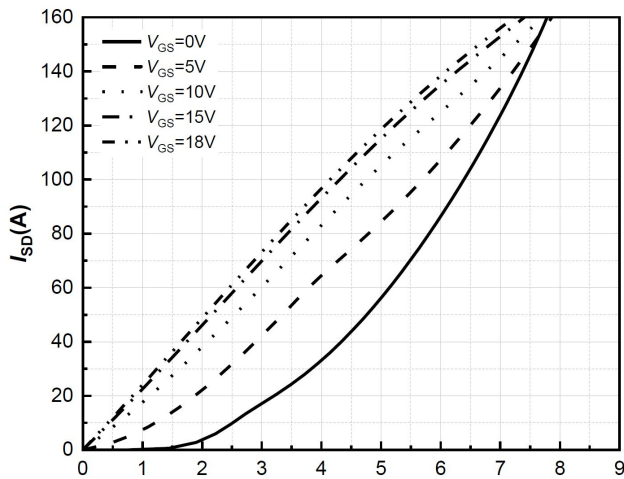
Gate Charge Characteristics



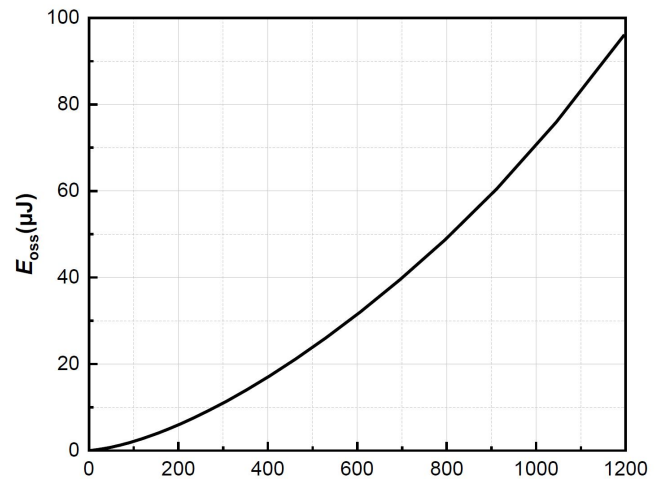
3rd Quadrant Characteristic $T_j = -40^\circ\text{C}$



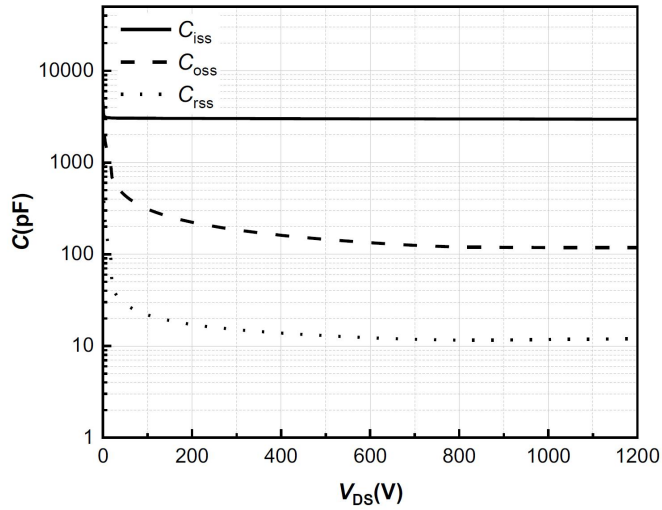
3rd Quadrant Characteristic $T_j = 25^\circ\text{C}$



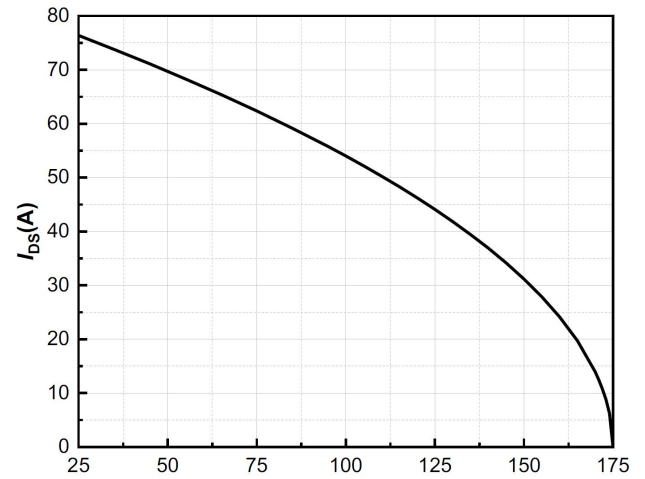
3rd Quadrant Characteristic $T_j = 175^\circ\text{C}$



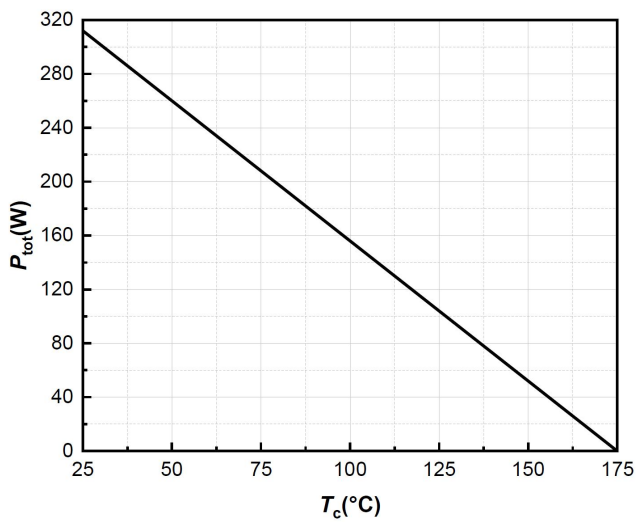
Output Capacitor Stored Energy



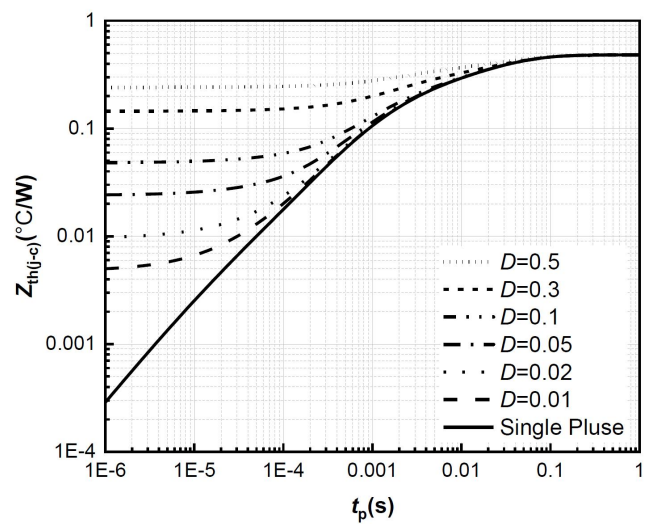
Capacitances vs. Drain-Source



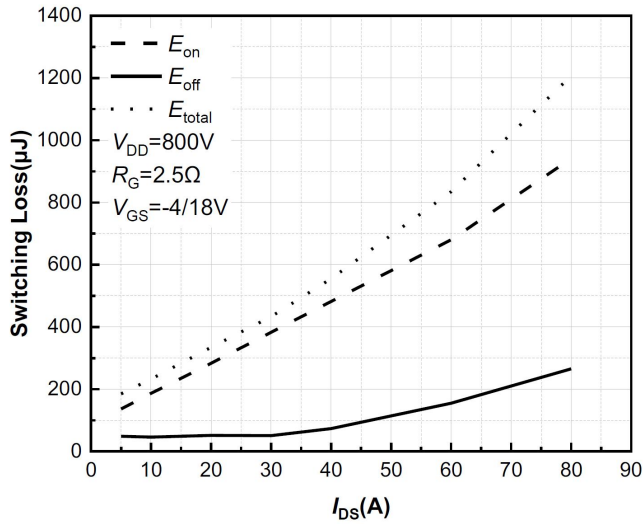
Continuous Drain Current Derating vs. Case Temperature



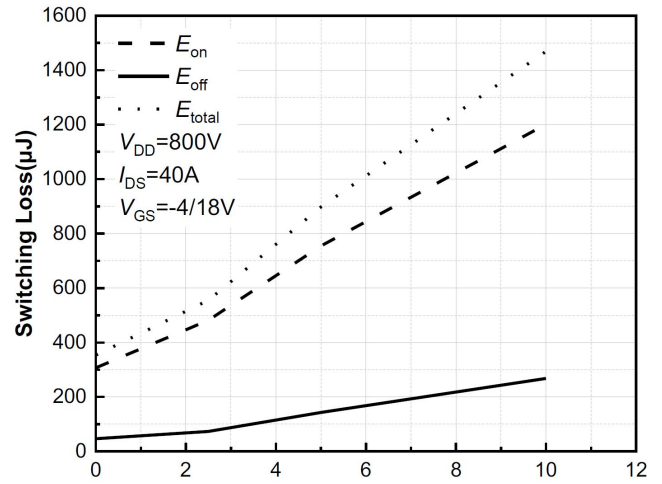
Maximum Power Dissipation Derating vs. Case Temperature



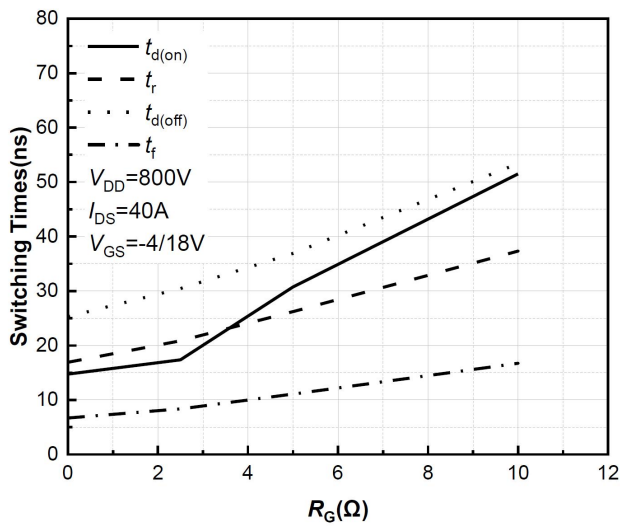
Transient Thermal Impedance



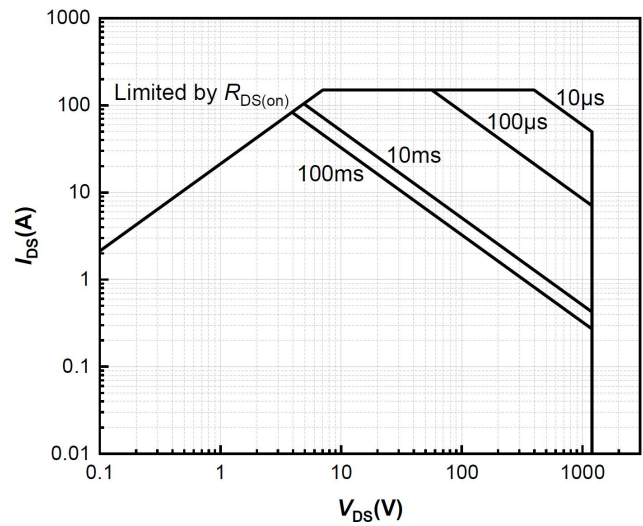
Clamped Inductive Switching Energy
vs. Drain Current



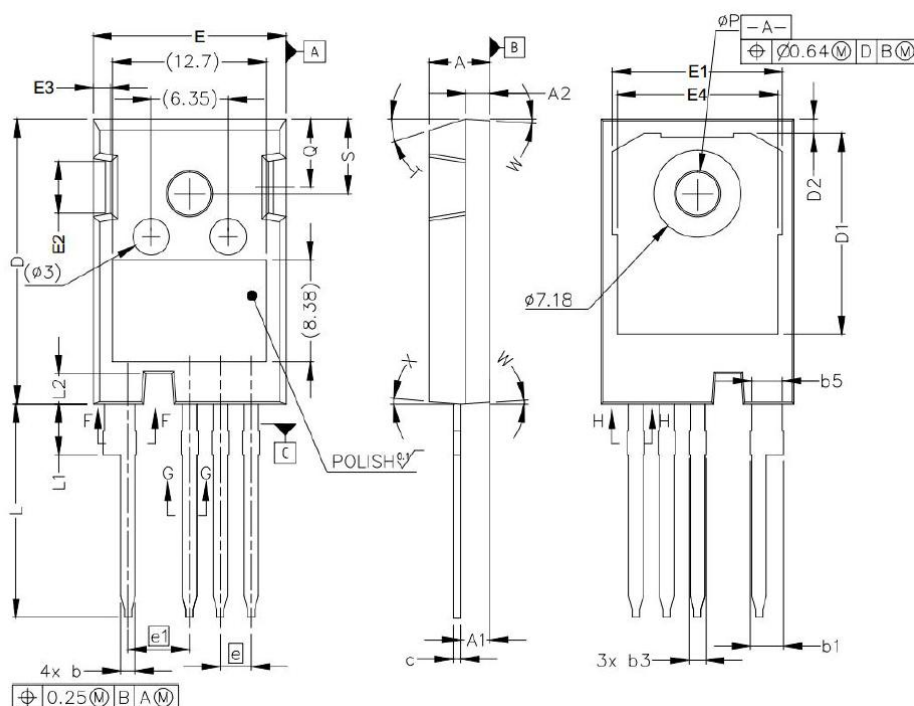
Clamped Inductive Switching Energy
vs. R_G



Switching Times vs. R_G



Safe Operating Area

TO-247-4L Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	0.19	0.21
A1	2.29	2.54	0.09	0.10
A2	1.91	2.16	0.08	0.09
b1	2.39	2.94	0.09	0.12
b3	1.07	1.60	0.04	0.06
b5	2.39	2.69	0.09	0.11
c	0.55	0.68	0.02	0.03
D	23.30	23.60	0.92	0.93
D1	16.25	17.65	0.64	0.69
D2	0.95	1.25	0.04	0.05
E	15.75	16.13	0.62	0.64
E1	13.10	14.15	0.52	0.56
E2	3.68	5.10	0.14	0.20
E3	1.00	1.90	0.04	0.07
E4	12.38	13.43	0.49	0.53
e	2.54 BSC		0.1 BSC	
e1	5.08 BSC		0.2 BSC	
L	17.31	17.82	0.68	0.70
L1	3.97	4.37	0.16	0.17
L2	2.35	2.65	0.09	0.10
ΦP	3.51	3.65	0.14	0.14
Q	5.49	6.00	0.22	0.24
S	6.04	6.30	0.24	0.25
T	17.5° REF.		0.69° REF.	
W	3.5° REF.		0.14° REF.	
X	4.0° REF.		0.16° REF.	