

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
1200V	40mΩ@18V	40A



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
- Motor Drive
- High Voltage DC/DC Converter
- Switching Mode Power Supply

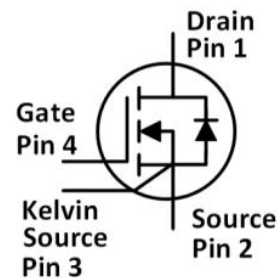
Package



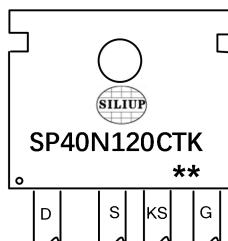
TO-247-4L

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

Circuit diagram



Marking



SP40N120CTK
**

:Device Code
:Week Code

Order Information

Device	Package	Unit/Tube
SP40N120CTK	TO-247-4L	30

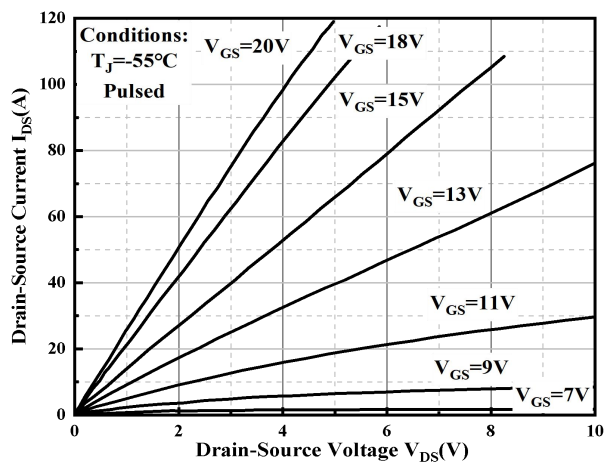
Absolute maximum ratings (Ta=25°C, unless otherwise noted)

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	69	A
Continuous Drain Current(Tc=100°C)	I_D	52	A
Pulsed Drain Current	I_{DM}	100	A
Total Power Dissipation(Tc=25°C)	P_D	394	W
Total Power Dissipation ² (Tc=100°C)	P_D	224	W
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.38	°C/W
Storage Temperature Range	T_{STG}	-55 to 175	°C
Operating Junction Temperature Range	T_J	-55 to 175	°C

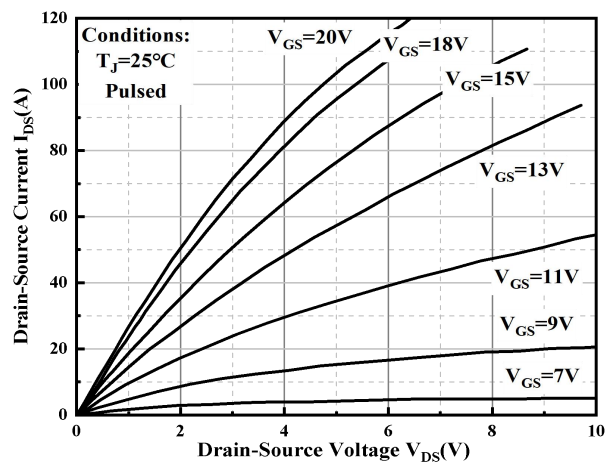
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V , ID=100uA	1200	-	-	V
Drain-Source Leakage Current	IDSS	V _{DS} =1200V, V _{GS} =0V, T _J =25°C	-	0.2	50	uA
Gate-Source Leakage Current	IGSS	V _{GS} =22V , V _{DS} =0V, T _J =25°C	-	0.8	100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{GS} =V _{DS} , I _D =10mA, T _J =25°C	2.0	3.0	3.5	V
		V _{GS} =V _{DS} , I _D =10mA, T _J =175°C	-	2.0	-	
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =18V , I _D =33.3A, T _J =25°C	-	40	51	mΩ
		V _{GS} =18V , I _D =33.3A, T _J =175°C	-	65	-	
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =1000V , V _{GS} =0V , f=100KHz , V _{AC} =25mV	-	2250	-	pF
Output Capacitance	C _{oss}		-	102	-	
Reverse Transfer Capacitance	C _{rss}		-	8	-	
Switching Characteristics						
Total Gate Charge	Q _g	V _{DS} =800V , V _{GS} = -4/+18V , I _D =33.3A	-	103	-	nC
Gate-Source Charge	Q _{gs}		-	28	-	
Gate-Drain Charge	Q _{gd}		-	34	-	
Turn-On Delay Time	T _{d(on)}	V _{DS} =800V , V _{GS} = -4/+18V , I _D =33.3A R _G =2.7Ω, L=120uH	-	16	-	ns
Rise Time	T _r		-	20	-	
Turn-Off Delay Time	T _{d(off)}		-	27	-	
Fall Time	T _f		-	16	-	
Turn-On Energy	E _{on}		-	260	-	μJ
Turn-Off Energy	E _{off}		-	60	-	
Total Switching Loss	E _{tot}		-	320	-	
Reverse Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} = -4V , I _{SD} =20A , T _J =25°C	-	3.9	-	V
		V _{GS} = -4V , I _{SD} =20A , T _J =175°C	-	3.5	-	
Reverse Recovery Time	t _{rr}	V _{GS} =-4V, I _{SD} =33.3A, V _R =800V, di/dt=1360A/μs	-	13.5	-	ns
Reverse Recovery Charge	Q _{rr}		-	164	-	nC
Peak Reverse Recovery Current	I _{rrm}		-	22	-	A
Maximum Body-Diode Continuous Current	I _S	V _{GS} = -4V , T _J =25°C	-	-	40-	A

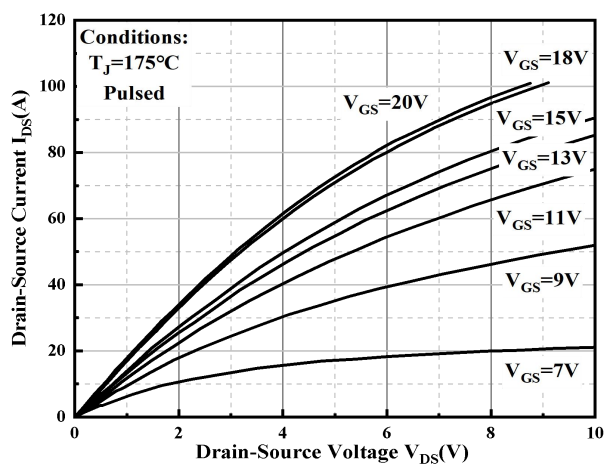
Typical Characteristics



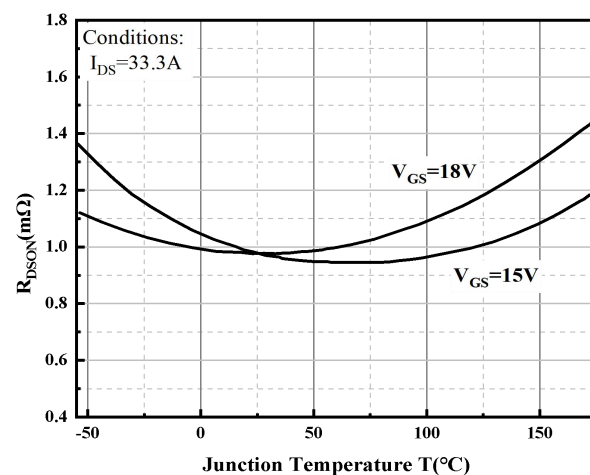
Typical output characteristic(-55°C)



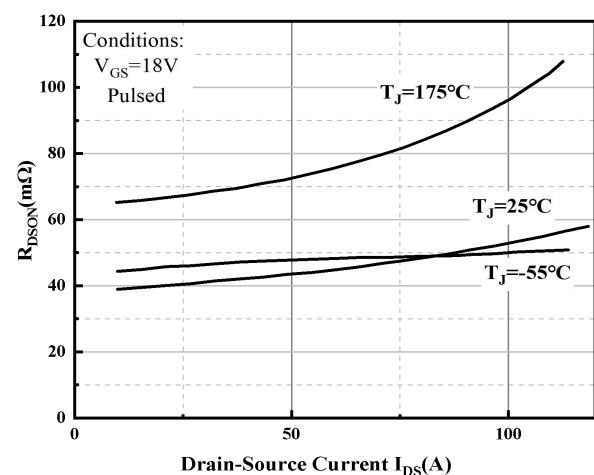
Typical output characteristic(25°C)



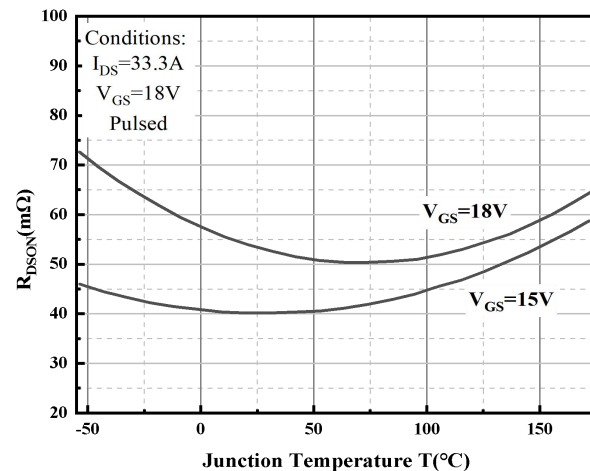
Typical output characteristic(175°C)



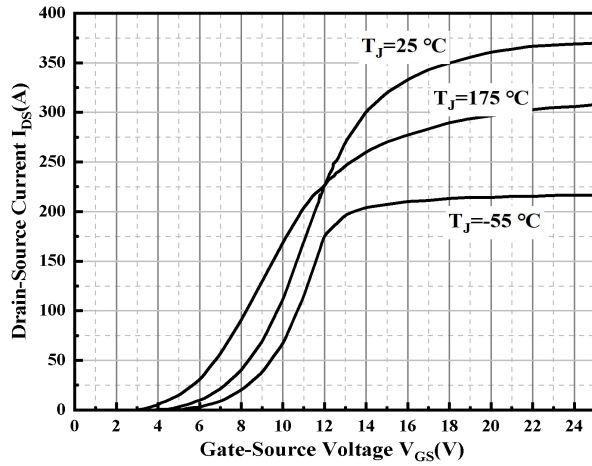
Normalized On-Resistance vs Temperature



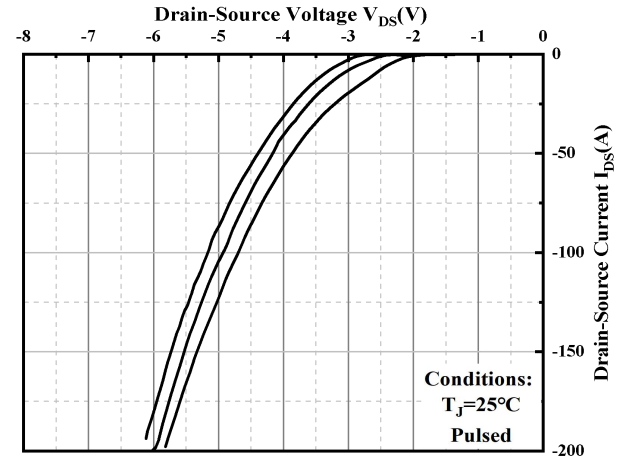
On-Resistance vs Drain Current For Various Temperatures Voltage



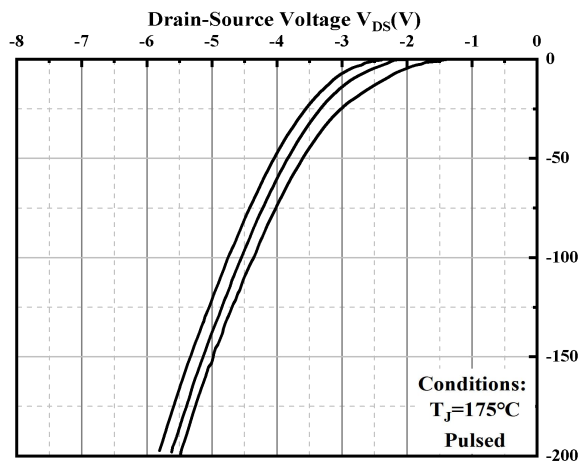
On-Resistance vs Temperature For Various Gate



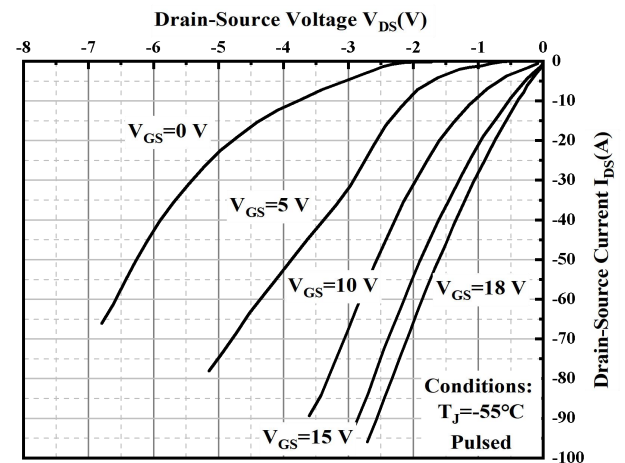
Transfer Characteristics for Various Temperatures



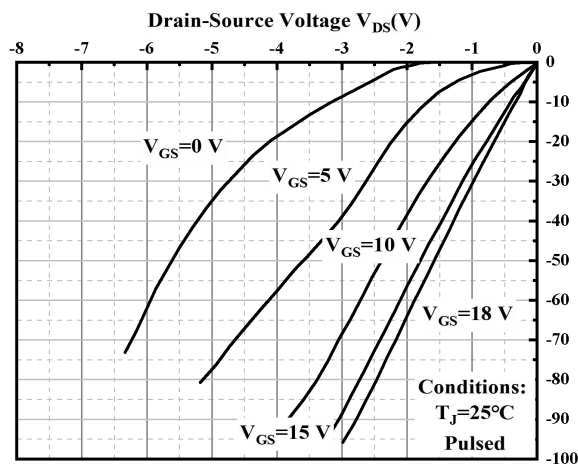
Body Diode Characteristics (25°C)



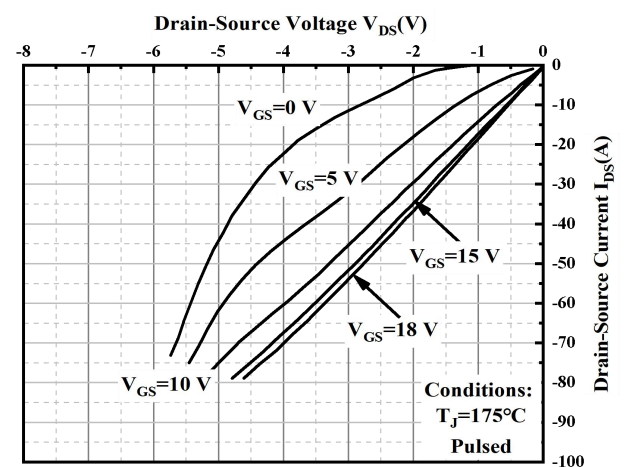
Body Diode Characteristics (175°C)



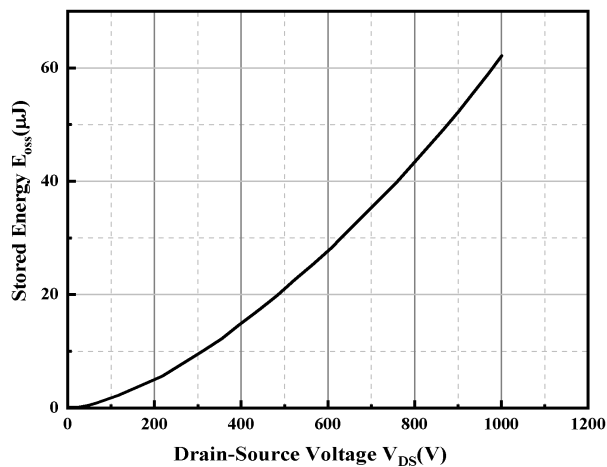
3rd Quadrant Characteristics (-55°C)



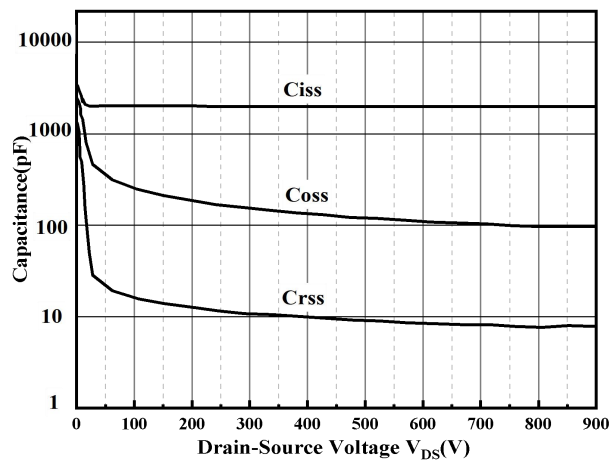
3rd Quadrant Characteristics (25°C)



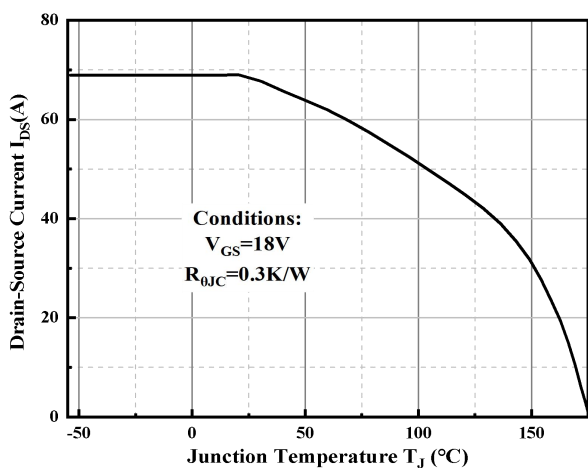
3rd Quadrant Characteristics (175°C)



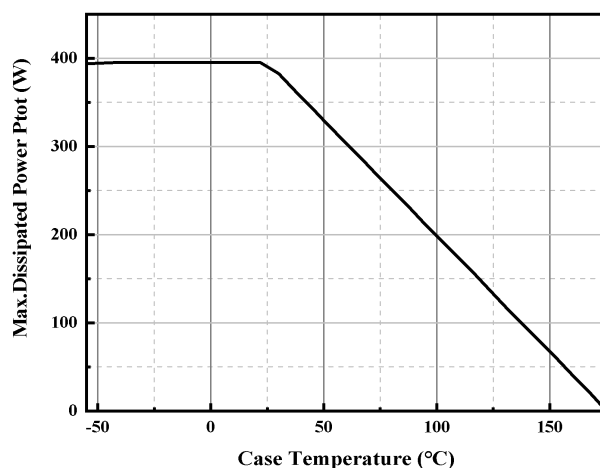
Output Capacitor Stored Energy



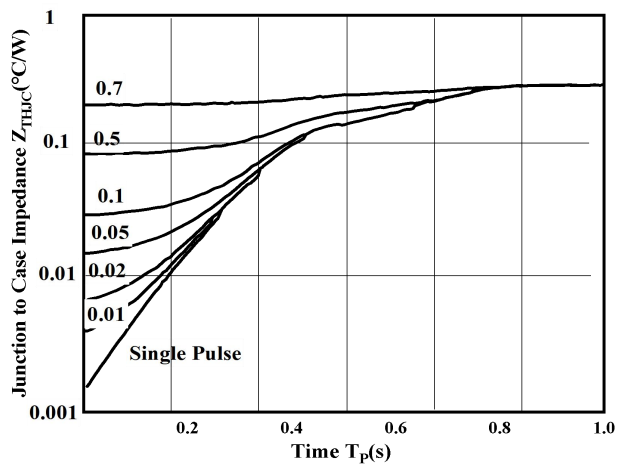
Capacitance vs. Drain-to-Source Voltage



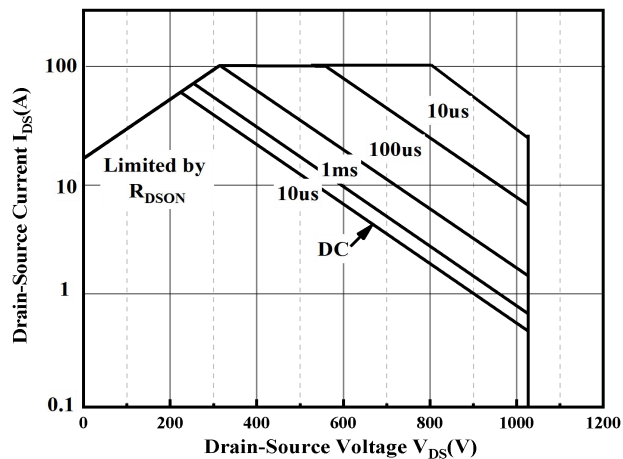
Continuous Drain Current Derating vs Case Temperature



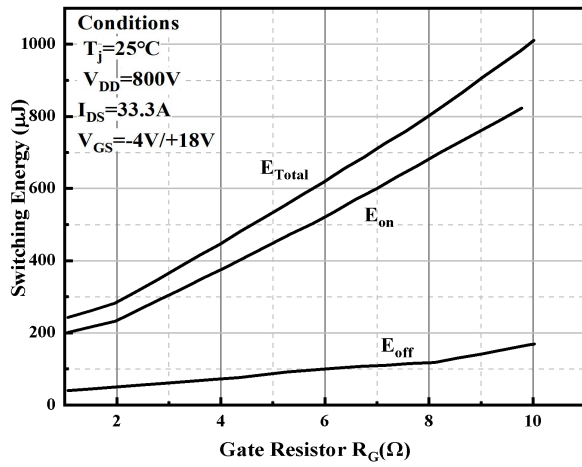
Power dissipation vs. Case temperature



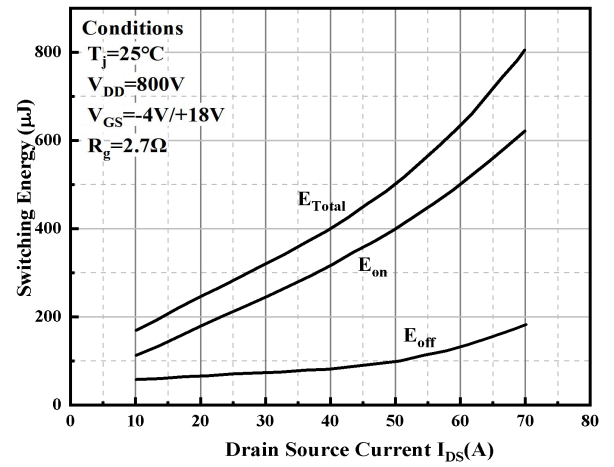
Transient Thermal Impedance (Junction-Case)



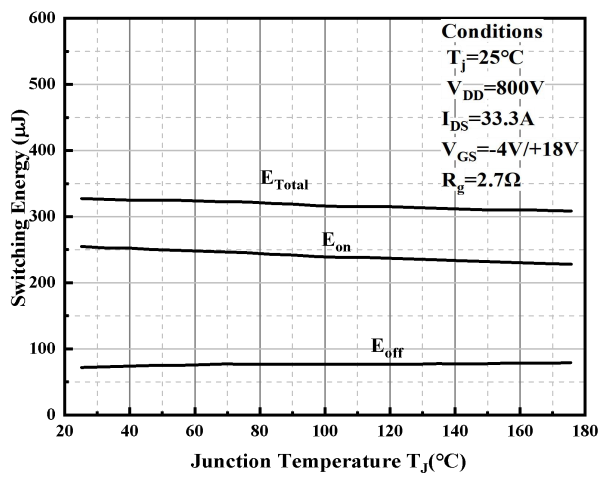
Safe Operation Area



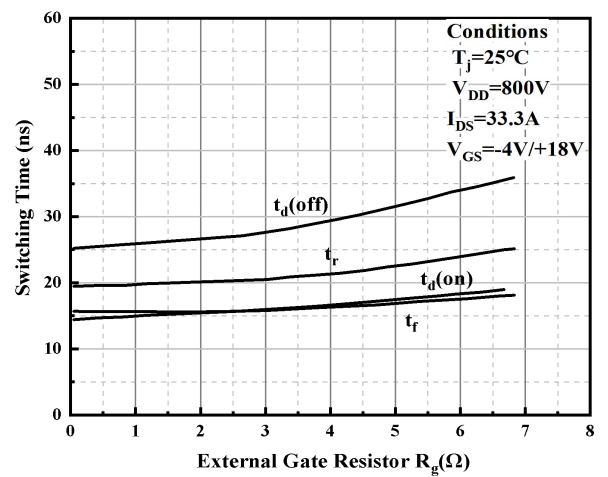
Clamped Inductive Switching Energy vs R_G



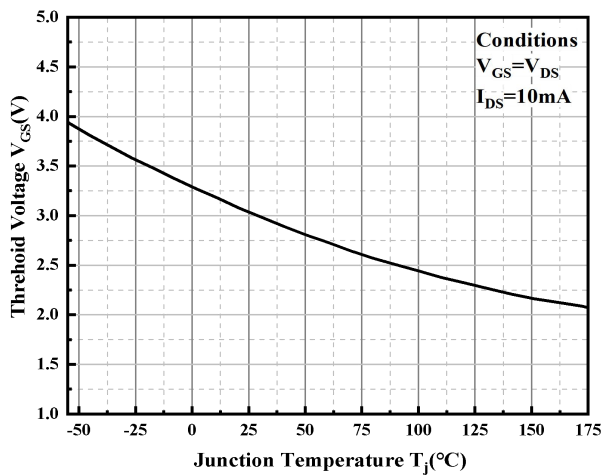
Clamped Inductive Switching Energy vs Drain Current



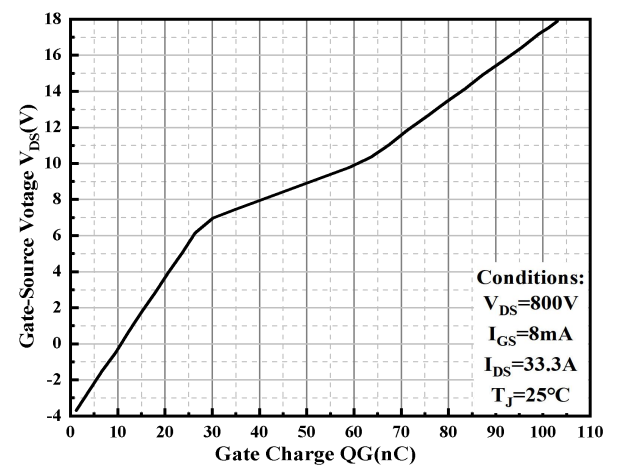
Clamped Inductive Switching Energy vs Temperature



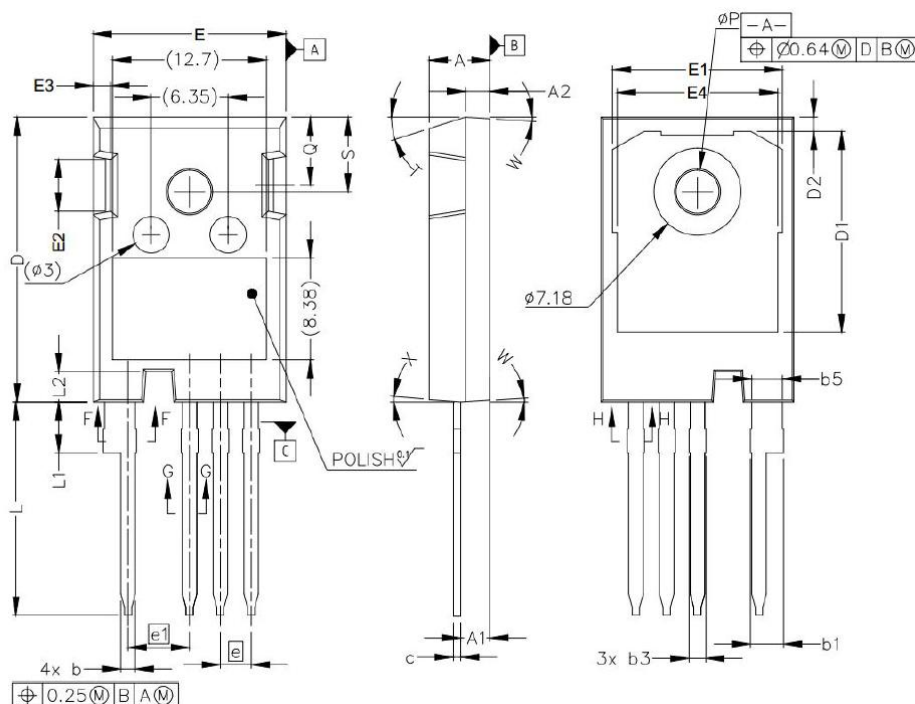
Switching Times vs R_G



Threshold Voltage vs Temperature



Gate Charge Characteristics

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.	