

Features

- SiC MOSFET Technology
- High Speed Switching
- Reduction Of Heat Sink Requirements
- Essentially No Switching Losses
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant("P" Suffix Designates RoHS Compliant. See Ordering Information) (Note2)

Maximum Ratings

- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance Junction to Case, Typ : 0.6°C/W

Applications

- Solar Inverters
- Uninterruptible Power Supply
- Photovoltaic Inverter
- Battery Chargers
- Motor Drives

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V _{DS}	1200	V
Gate-Source Voltage ^(Note 4)		V _{GSmax}	-10/+25	V
Gate-Source Voltage		V _{GSop}	-5/+20	V
Continuous Drain Current V _{GS} =20V	T _C =25°C	I _D	55	A
	T _C =110°C		36	
Pulsed Drain Current ^(Note 5)		I _{DM}	223	A
Total Power Dissipation	T _C =25°C	P _D	250	W
	T _C =110°C		108	
Avalanche Energy, Single Pulse	V _{DD} =75V, L=30mH	E _{AS}	650	mJ

Note1: Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

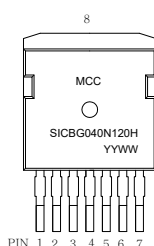
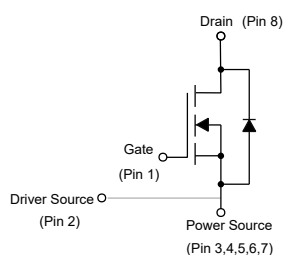
Note2: High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.

Note3: Device in a still air environment with $T_A=25^\circ C$.

Note4: AC $f > 1Hz$, duty cycle < 1%

Note5: Pulse Test: Pulse Width Limited by T_{jmax} .

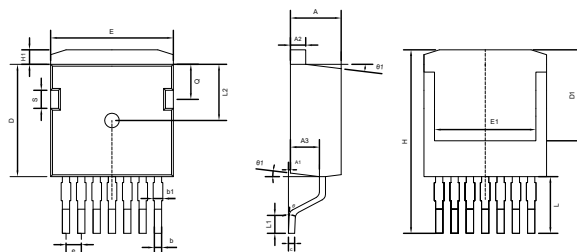
Internal Structure and Marking Code



Device Code: SICBG040N120H
Date Code: YYWW (Year & Week)

SiC N-CHANNEL MOSFET

TO-263-7L(A)



DIM	INCH		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.169	0.177	4.30	4.50	
A1	0.000	0.008	0.00	0.20	
A2	0.048	0.052	1.22	1.32	
A3	0.091	0.098	2.30	2.50	
b	0.020	0.028	0.50	0.70	
b1	0.000	0.030	0.00	0.75	
c	0.018	0.022	0.45	0.55	
D	0.360	0.372	9.15	9.45	
D1	0.315		8.00		TYP
E	0.398	0.401	10.12	10.20	
E1	0.303	0.319	7.70	8.10	
e	0.049	0.051	1.25	1.29	
H	0.585	0.596	14.85	15.15	
H1	0.043	0.051	1.10	1.30	
L	0.177	0.193	4.50	4.90	
L1	0.067	0.091	1.70	2.30	
L2	0.179	0.187	4.55	4.75	
S	0.055	0.063	1.40	1.60	
Q	0.110	0.118	2.80	3.00	
θ			0°	8°	
θ1			5°	9°	

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =100uA	1200			V
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =20V			250	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V		< 1	50	μA
		V _{DS} =1200V, V _{GS} =0V, T _j =175℃		10	500	μA
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =40mA	1.5	2.7	4.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =20V, I _D =30A		40	52	mΩ
		V _{GS} =20V, I _D =30A, T _j =175℃		75		mΩ
Transconductance	g _f	V _{DS} =20V, I _D =30A		15		S
Diode Characteristics						
Continuous Body Diode Current	I _S	V _{GS} =0V, T _C =25℃		42		A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _{SD} =15A		3.8		V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _{SD} =15A, V _{DS} =800V, dI _F /dt=300A/μs		65		ns
Reverse Recovery Charge	Q _{rr}			160		nC
Peak Reverse Recovery Current	I _{rrm}			4.3		A
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =800V, V _{GS} =0V, f=1MHz V _{AC} =25mV		3619		pF
Output Capacitance	C _{oss}			145		
Reverse Transfer Capacitance	C _{rss}			18		
Coss Stored Energy	E _{oss}			59		μJ
Total Gate Charge	Q _g	V _{DS} =800V, V _{GS} =-5/+20V I _D =30A		229		nC
Gate-Source Charge	Q _{gs}			68		
Gate-Drain Charge	Q _{gd}			66		
nternal Gate Resistance	R _{G(int)}	f=1MHZ, V _{AC} =25mV		2.0	5.0	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} =800V, V _{GS} =-5/+20V, R _{G(ext)} =2.7Ω, I _D =30A, L=100μH		10.4		ns
Turn-On Rise Time	t _r			23.3		
Turn-Off Delay Time	t _{d(off)}			32		
Turn-Off Fall Time	t _f			13.5		
Turn-On switching energy	E _{on}	V _{DD} =800V, V _{GS} =-5/+20V,		588		μJ
Turn-Off switching energy	E _{off}	R _{G(ext)} =2.7Ω, I _D =30A, L=100μH		117		

Curve Characteristics

Fig. 1 - Typical Output Characteristics

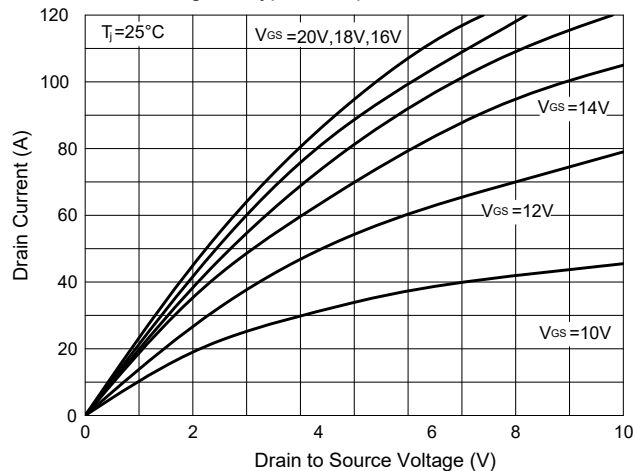


Fig. 2 - Typical Output Characteristics

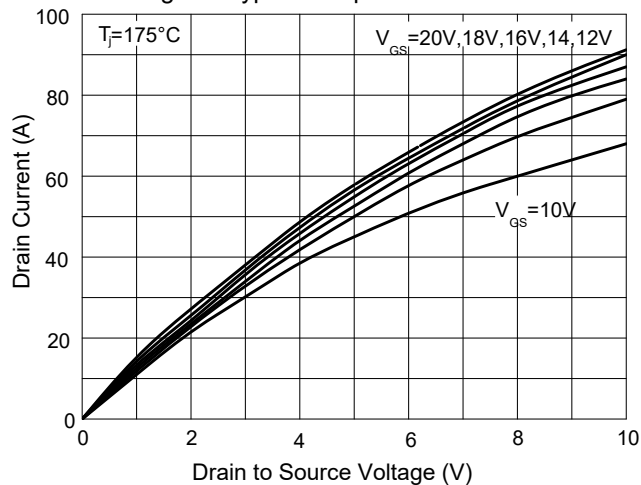


Fig. 3 - On-Resistance vs. Drain Current

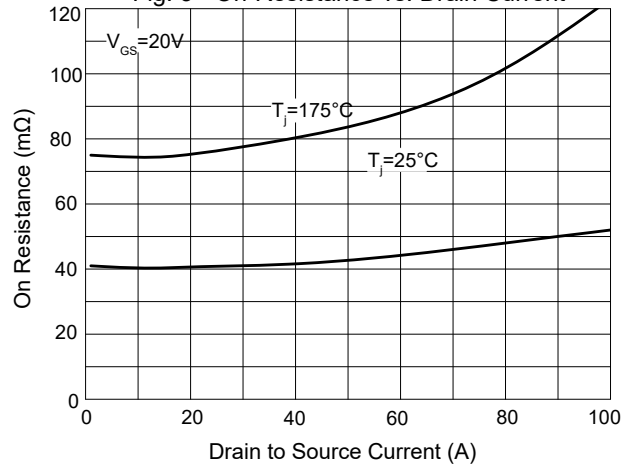


Fig. 4 - Transfer Characteristics

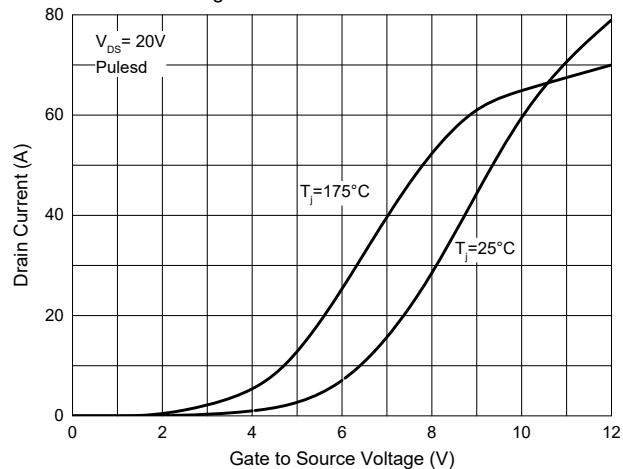


Fig. 5 - On-Resistance vs. Gate Voltage

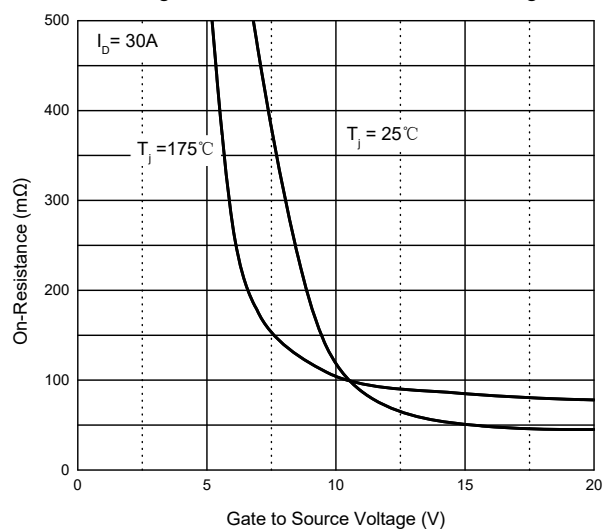
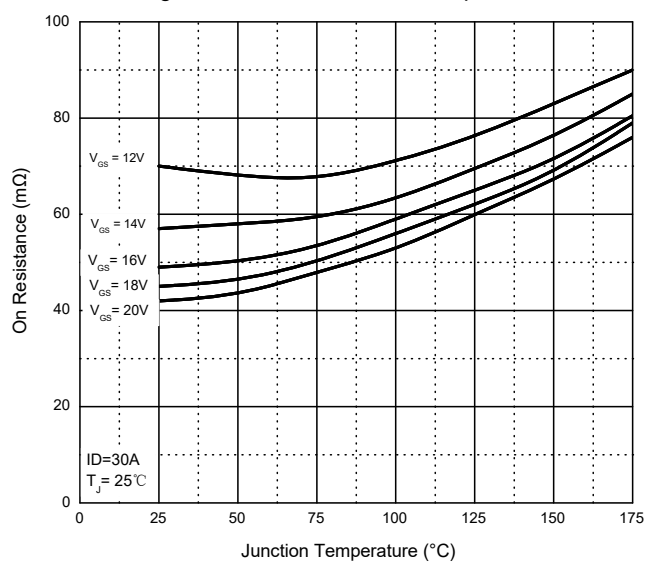


Fig. 6 - On-Resistance vs. Temperature



Curve Characteristics

Fig. 7 - Normalized On-Resistance vs Temperature

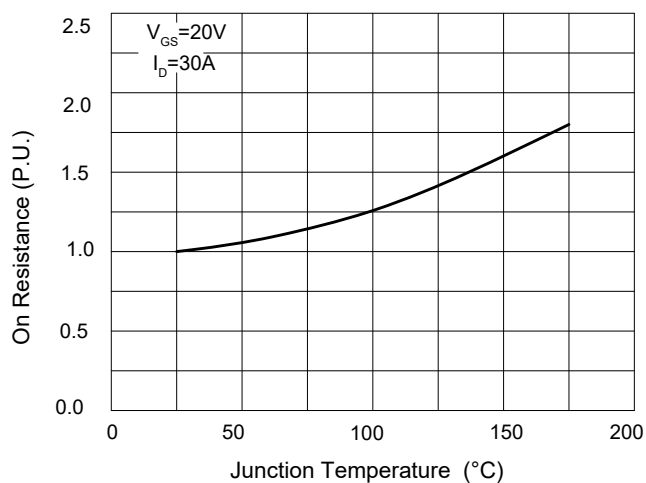


Fig. 8 - Reverse Output Voltage

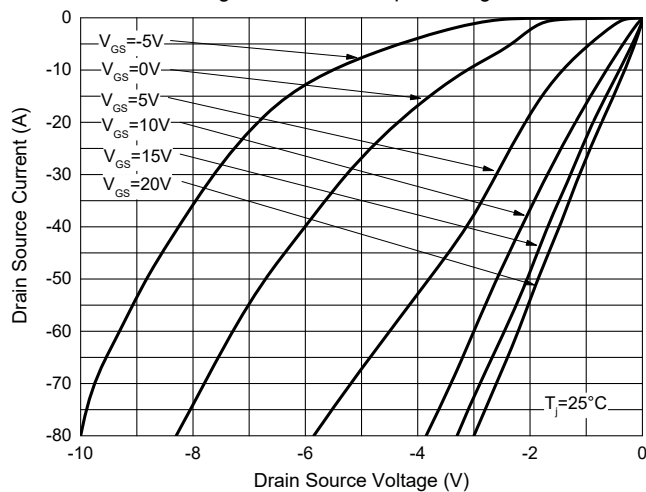


Fig. 9 - Reverse Output Voltage

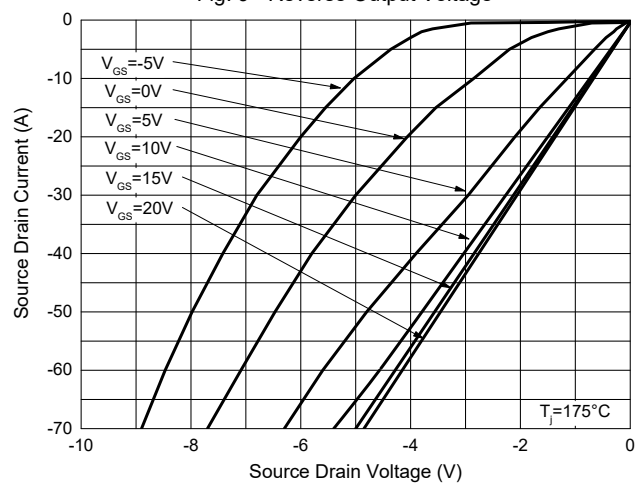


Fig. 10 - Capacitance Characteristics

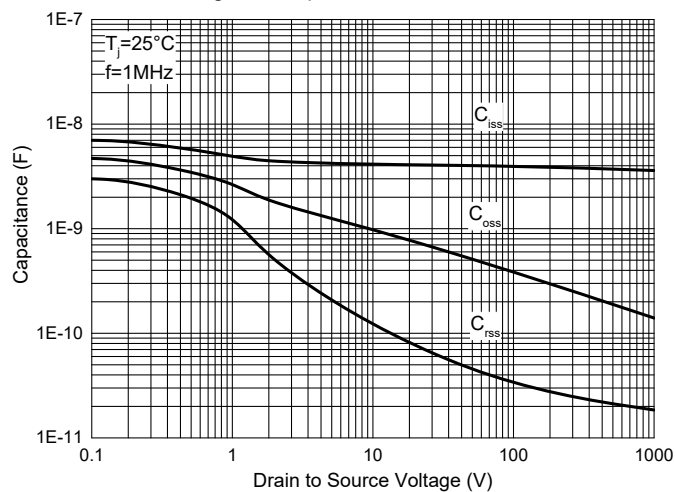


Fig. 11 - Threshold Voltage vs Temperature

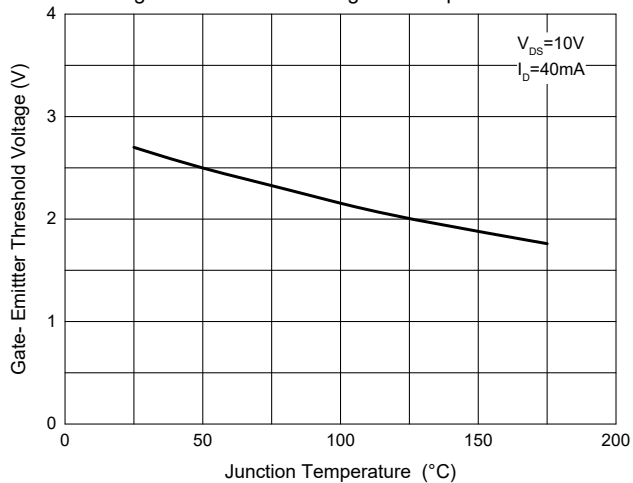
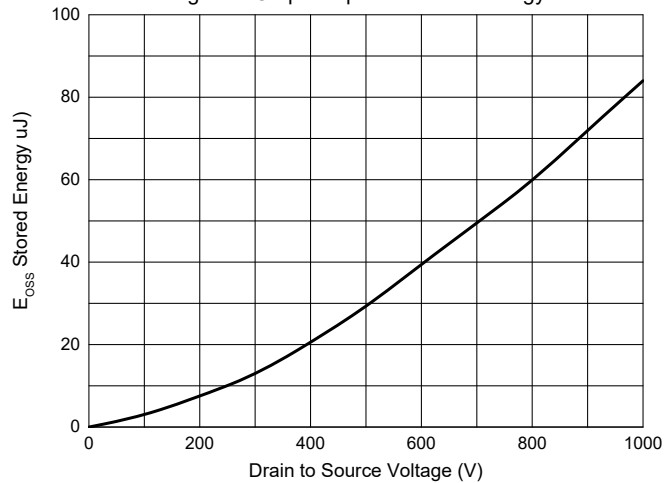


Fig. 12 - Output capacitor stored energy



Curve Characteristics

Fig. 13 - Power Derating

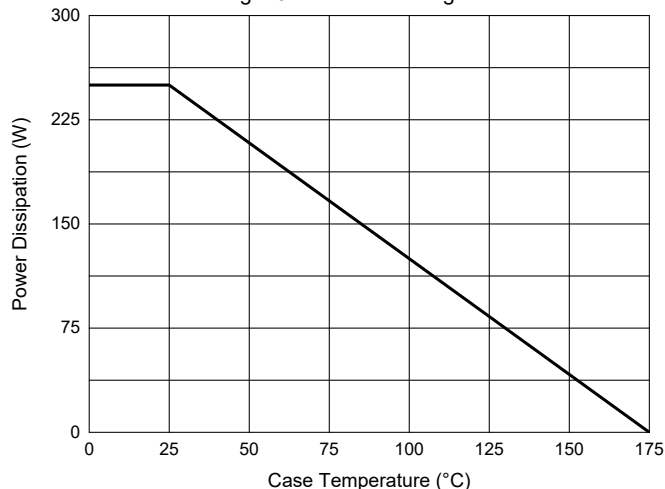


Fig. 14 - Drain Current Derating vs Case Temperature

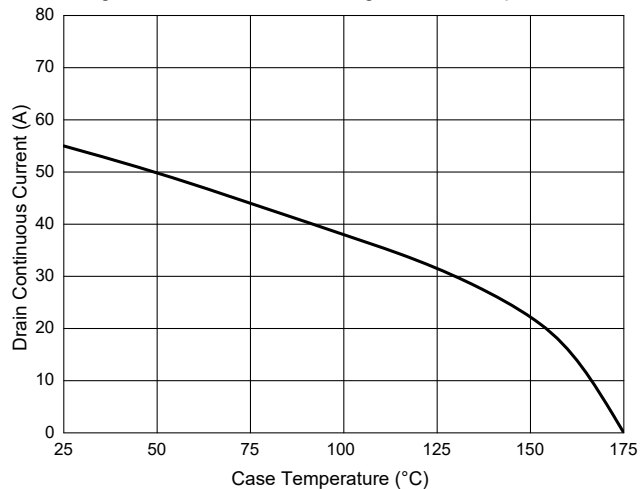


Fig. 15 - Safe Operation Area

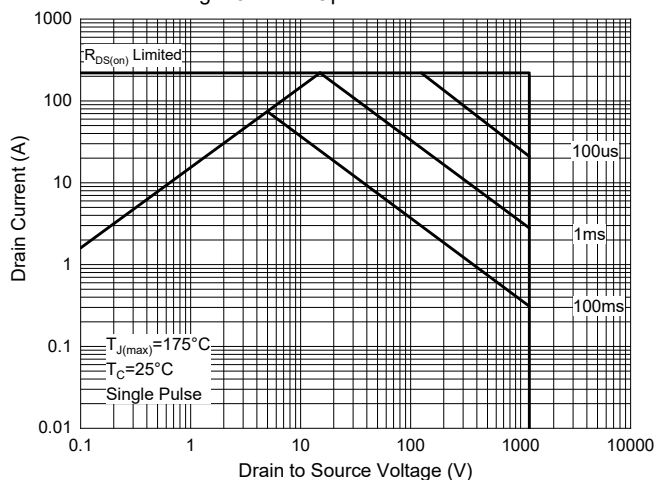


Fig. 16 - Typical Gate Charge

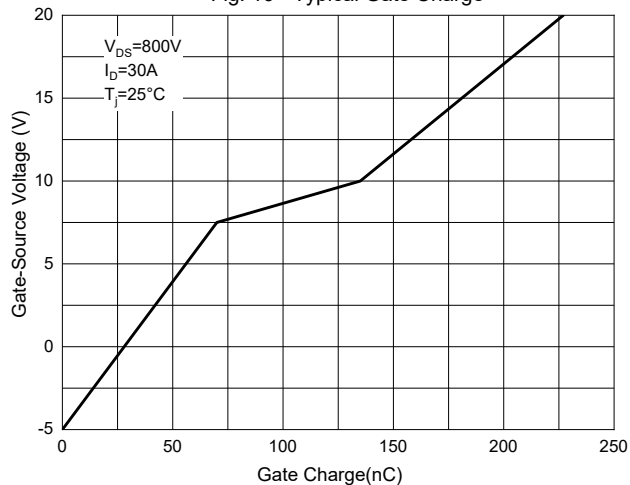


Fig. 17 - Clamped Inductive Switching Energy vs I_D

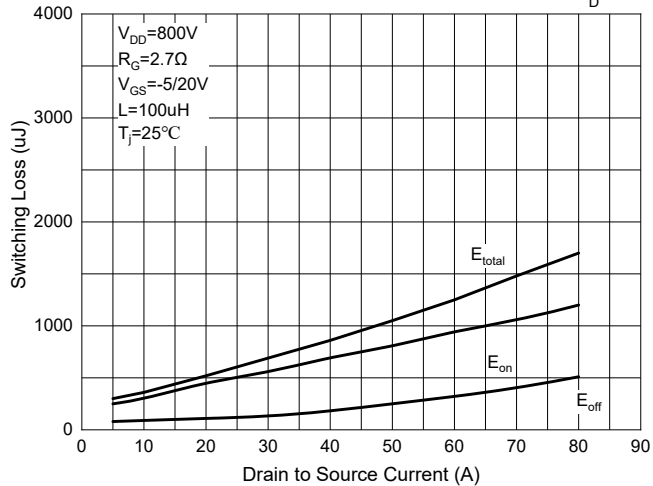
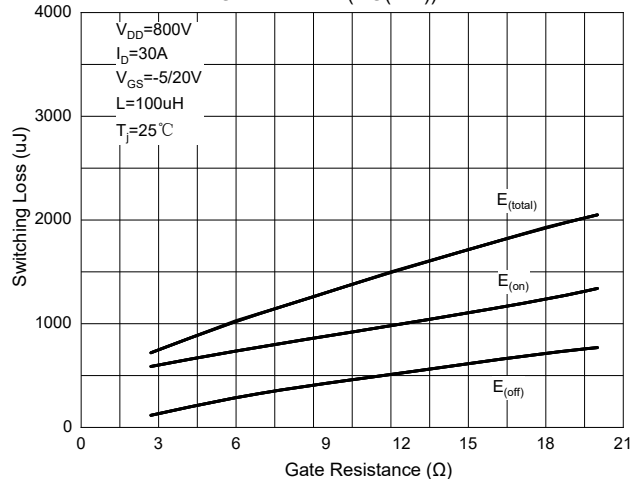
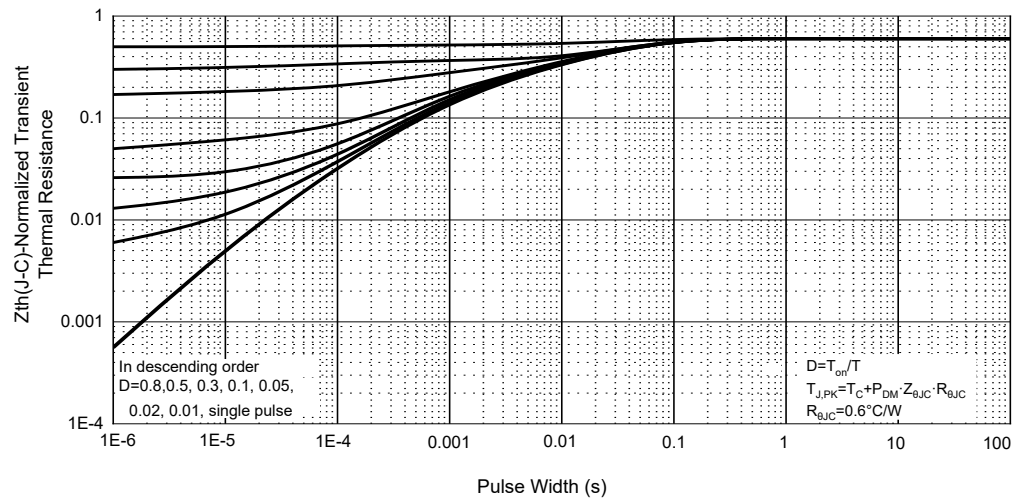


Fig. 18 - Clamped Inductive Switching Energy vs. External Gate Resistor ($R_{G(ext.)}$)



Curve Characteristics

Fig. 19 - Normalized Transient Thermal Impedance



Ordering Information

Device	Packing
Part Number-TP	800pcs/Reel

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