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)

SiC N-CHANNEL MOSFET

Maximum Ratings

- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance Junction to Ambient,Max(Note 3): 62°C/W
- Thermal Resistance Junction to Case,Typ : 0.4°C/W

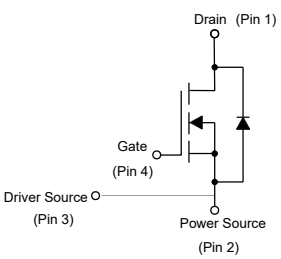
Applications

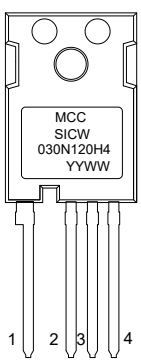
- Solar Inverters
- Uninterruptible Power Supply
- Photovoltaic Inverter
- Battery Chargers
- Motor Drives

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	Tc=25°C	I_D	78	A
	Tc=110°C		53	
Pulsed Drain Current (Note 5)		I_{DM}	349	A
Total Power Dissipation	Tc=25°C	P_D	375	W
	Tc=110°C		162	
Avalanche Energy, Single Pulse	V_{DD}=100V, I_D=14A	E_{AS}	2.5	J

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 TA=25°C.
Note4:AC f > 1Hz, duty cycle < 1%
Note5:Pulse Test: Pulse Width Limited by Tjmax.

Internal Structure and Marking Code

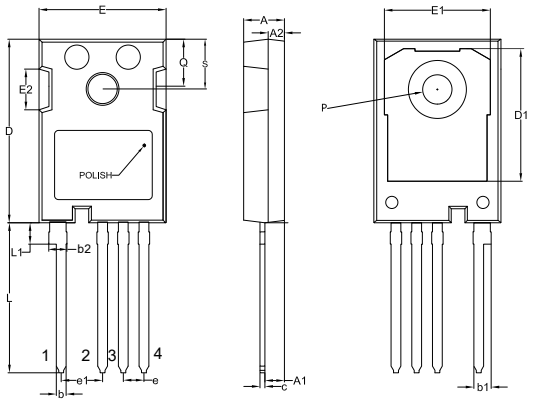




Device Code: SICW030N120H4

Date Code: YYWW (Year & Week)

TO-247-4



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.189	0.205	4.80	5.20	
A1	0.090	0.098	2.29	2.50	
A2	0.074	0.082	1.88	2.08	
b	0.043	0.054	1.10	1.36	
b1	0.093	0.108	2.35	2.75	
b2	0.094	0.112	2.39	2.84	
c	0.022	0.028	0.55	0.70	
D	0.917	0.929	23.30	23.60	
D1	0.640	0.663	16.25	16.85	
E	0.620	0.632	15.75	16.05	
E1	0.543	0.559	13.80	14.20	
E2	0.173	0.201	4.4	5.10	
e	0.100		2.54		
e1	0.199		5.06		
L	0.683	0.694	17.34	17.64	
L1	0.157	0.169	4.00	4.30	
P	0.138	0.148	3.51	3.75	Φ
Q	0.220	0.236	5.60	6.00	
S	0.220	0.248	5.60	6.30	

Electrical Characteristics @ T_j=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=100μA	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			50	μA
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=50mA	2	3.2	4.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=20V, I_D=40A		30	40	mΩ
		V_{GS}=20V, I_D=40A,T_j =175°C		54		mΩ
Internal Gate Resistance	R_g	f=1MHz, V_{AC}=25mV		0.7		Ω
Transconductance	g_{FS}	V_{DS}=15V, I_D=40A		17		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=800V,V_{GS}=0V, f=1MHz,V_{AC}=25mV		4909		pF
Output Capacitance	C_{oss}			198		
Reverse Transfer Capacitance	C_{rss}			34		
Coss Stored Energy	E_{oss}			80.5		μJ
Total Gate Charge	Q_g	V_{DS}=800V,V_{GS}=-5/+20V, I_D=40A		305		nC
Gate-Source Charge	Q_{gs}			91		
Gate-Drain Charge	Q_{gd}			88		
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=800V, V_{GS}=-4/+20V, R_G=2.7Ω, I_D=40A, R_L=20Ω		31		ns
Rise Time	t_r			55		
Turn-Off Delay Time	$t_{d(off)}$			8		
Fall Time	t_f			12		
Turn-On switching energy	E_{on}	V_{DD}=800V, V_{GS}=0/+20V, R_G=2.7Ω, I_D=40A		167		μJ
Turn-Off switching energy	E_{off}			254		
Diode Characteristics						
Continuous Body Diode Current	I_S	V_{GS}=0V, T_C=25°C		50		A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=10A		3		V
Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_{SD}=30A, V_{DS}=400V, dI_F/dt=300A/μs		79		ns
Reverse Recovery Charge	Q_{rr}			284		nC
Peak Reverse Recovery Current	I_{rrm}			6.8		A

Curve Characteristics(T_J=25℃ unless otherwise specified)

Fig. 1 - Typical Output Characteristic (T_j=25°C)

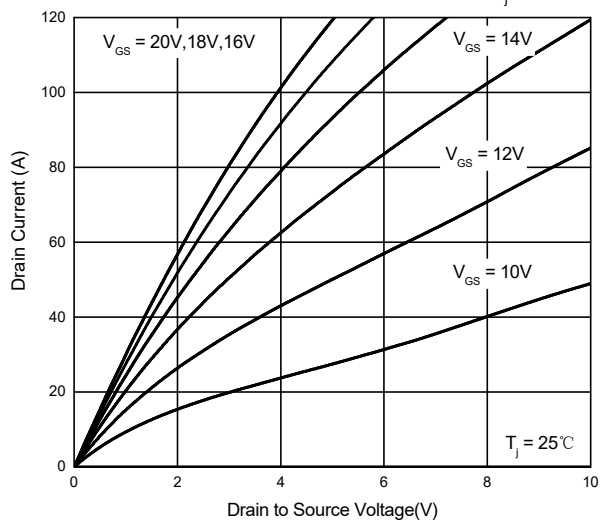


Fig. 2 - Typical Output Characteristic (T_j=175°C)

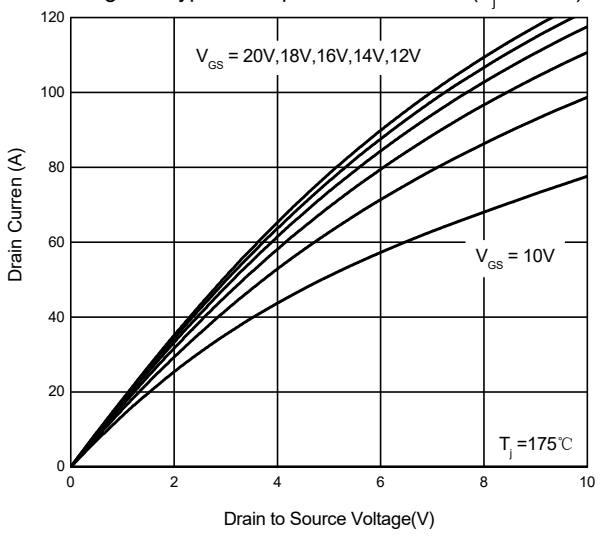


Fig. 3 -On-Resistance vs. Drain Current

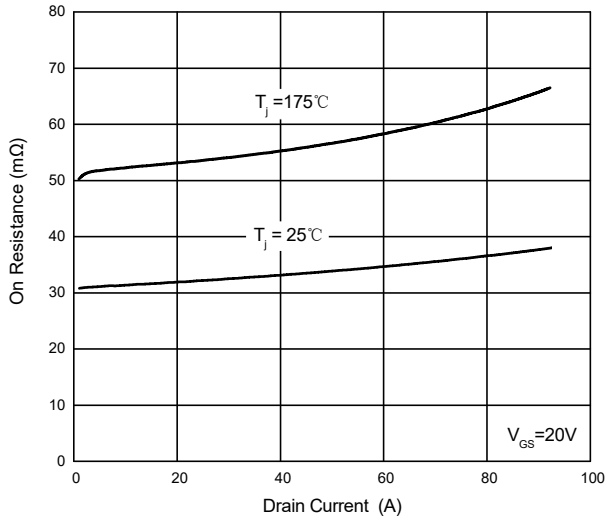


Fig. 4 - Typical Transfer Characteristic

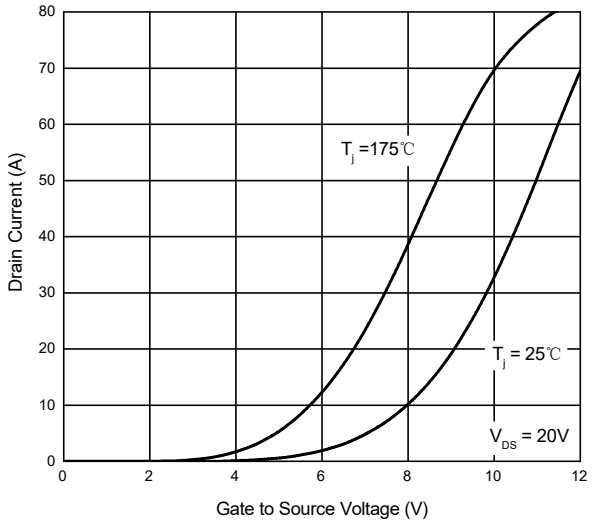


Fig. 5 - On-Resistance vs. Gate Voltage

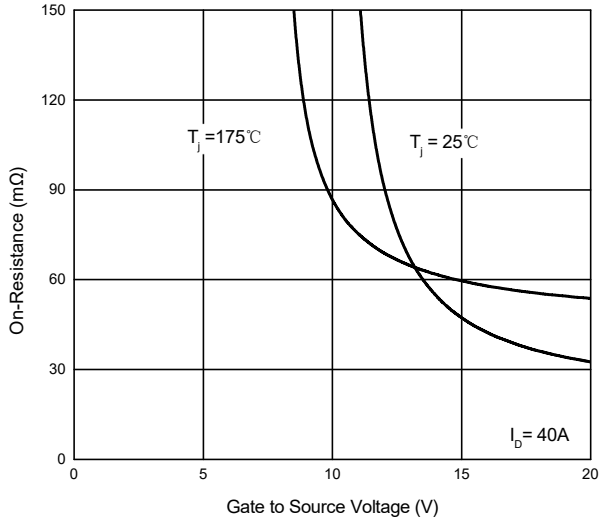
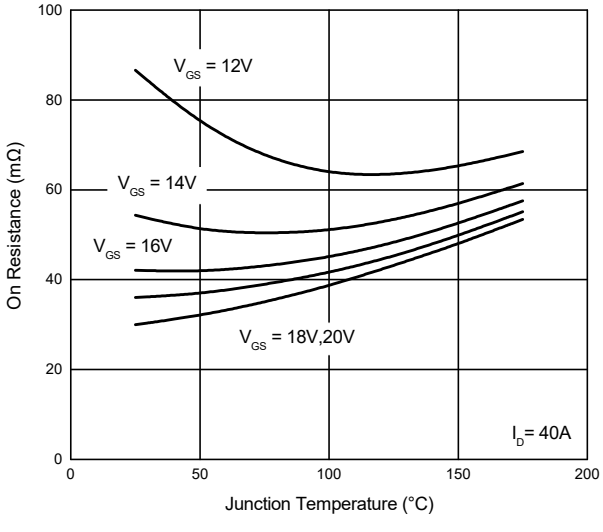


Fig. 6 - On-Resistance vs. Temperature



Curve Characteristics(T_J=25℃ unless otherwise specified)

Fig. 7 - Normalized On-Resistance vs. Temperature

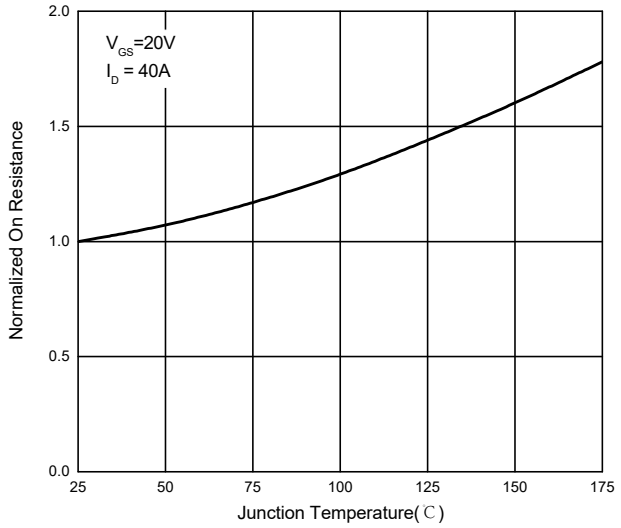


Fig. 8 - Reverse Output Voltage

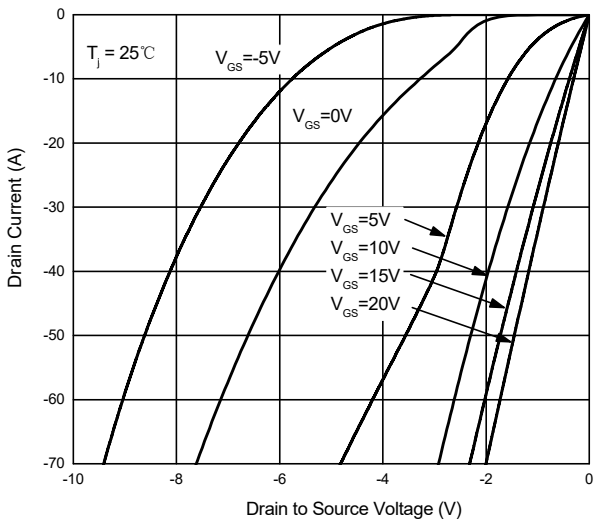


Fig. 9 - Reverse Output Voltage

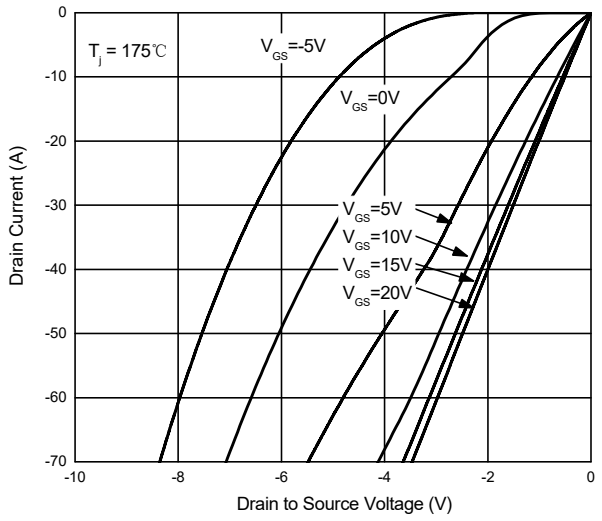


Fig. 10 - Capacitances vs. V_{DS}

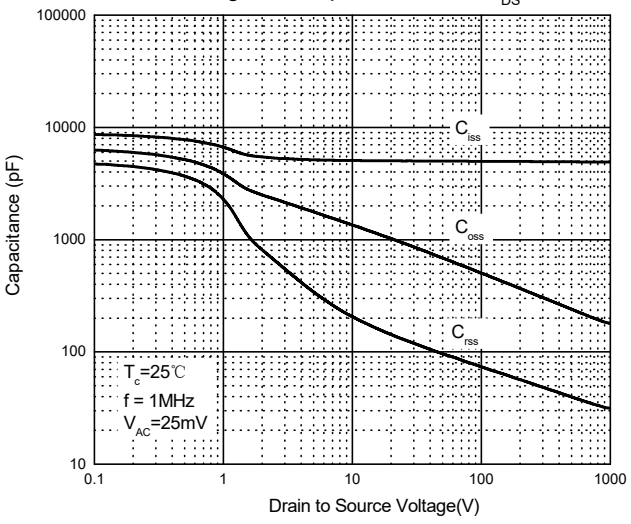


Fig. 11 - Threshold Voltage vs. Temperature

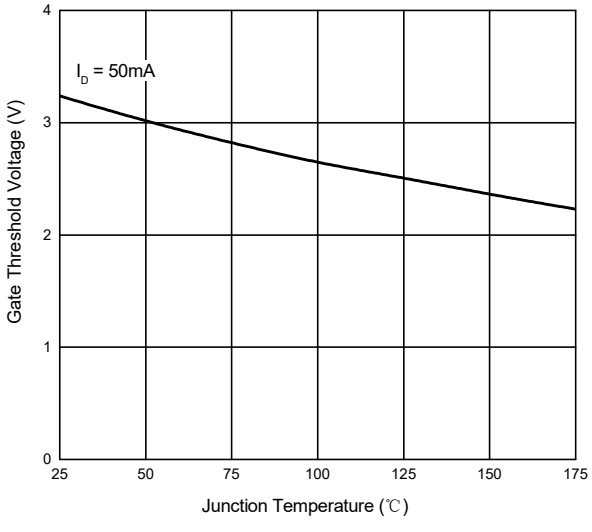
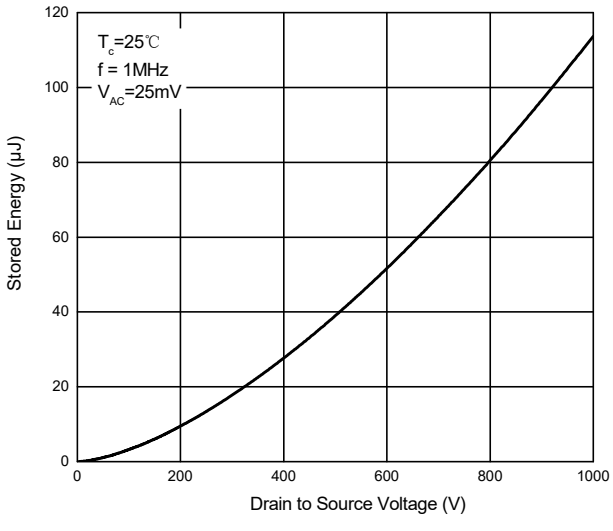


Fig. 12 - Output Capacitor Stored Energy



Curve Characteristics(T_J=25℃ unless otherwise specified)

Fig. 13 - Power Derating

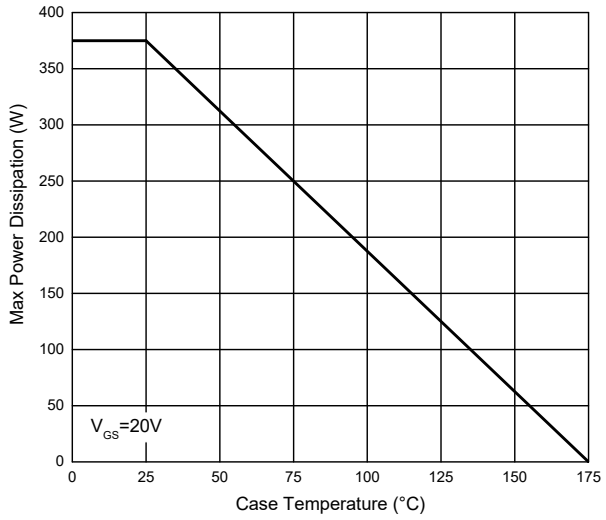


Fig. 14 - Drain Current Derating

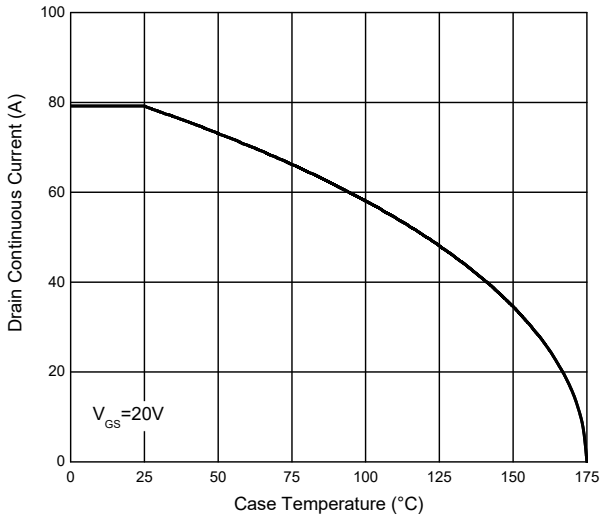


Fig. 15 -Safe Operation Area

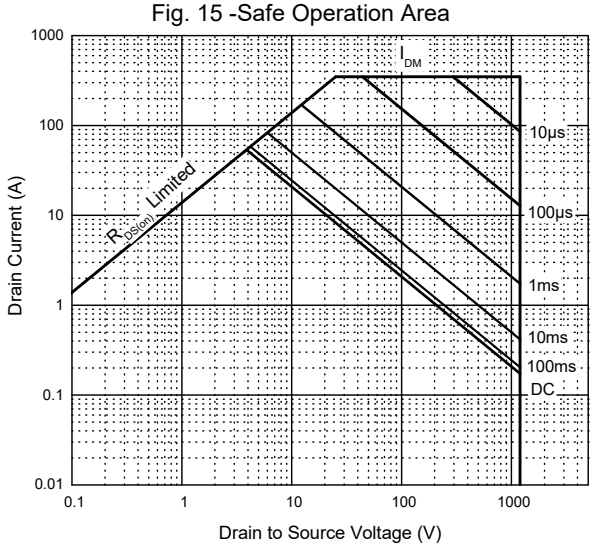


Fig. 16 - Typical Gate Charge

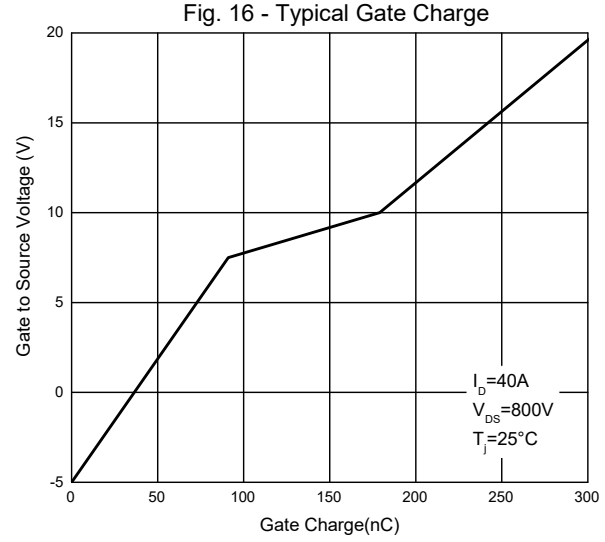


Fig. 17 - Clamped Inductive Switching Energy vs. Drain Current

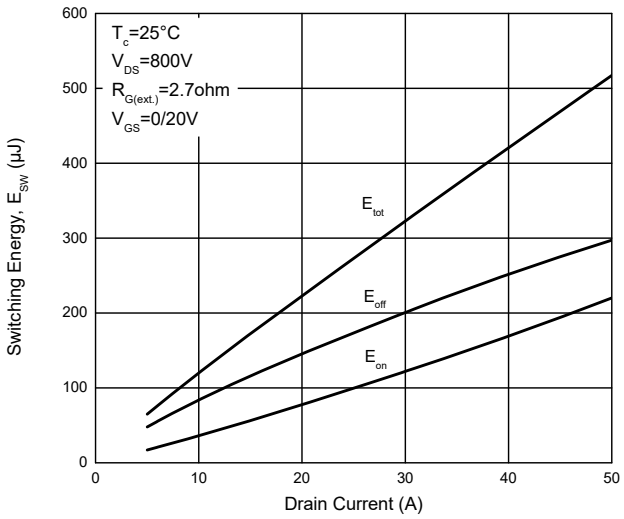
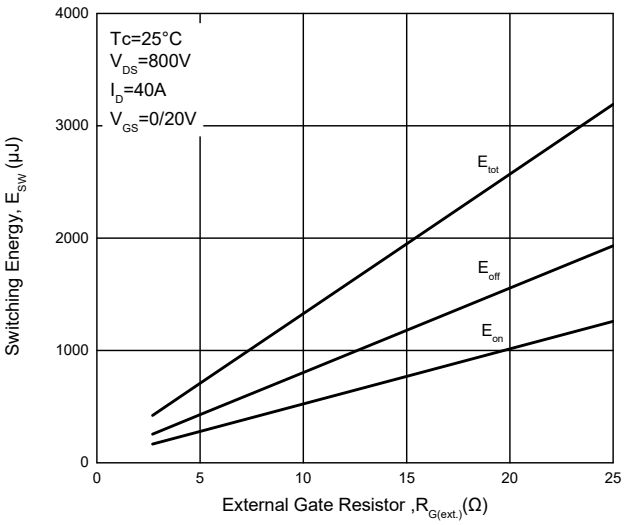
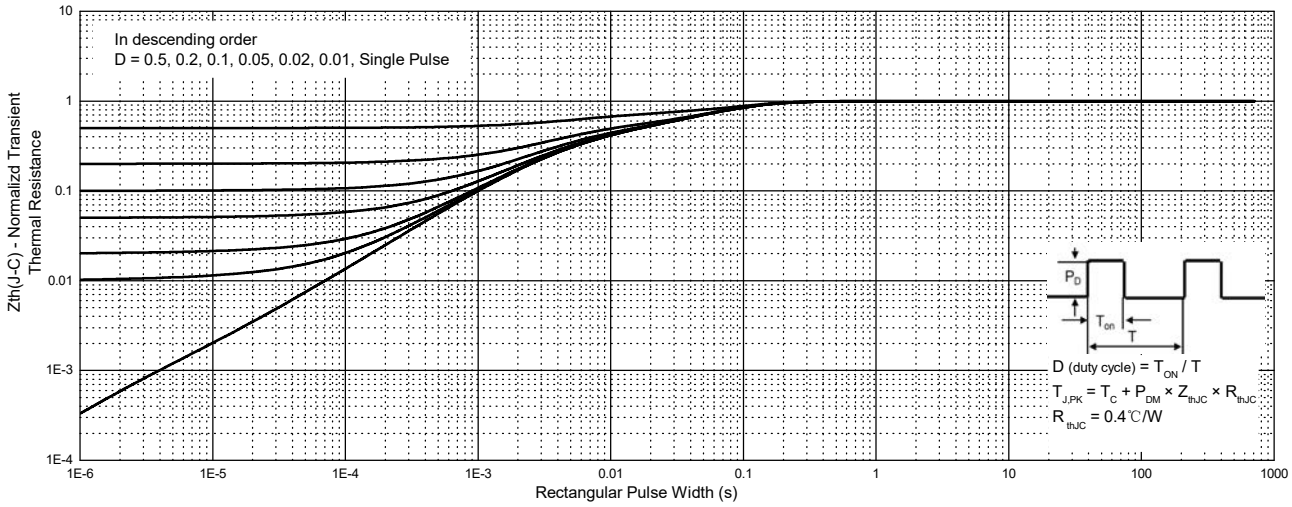


Fig. 18 - Clamped Inductive Switching Energy vs. External Gate Resistor ($R_{G(ext.)}$)



Curve Characteristics(T_J=25℃ unless otherwise specified)

Fig.19 - Normalized Transient Thermal Impedance



Ordering Information

Device	Packing
SICW030N120H4-BP	Tube:30pcs/Tube, 1.8K/Ctn;