

Features

- SiC MOSFET Technology
- High Blocking Voltage with Low On-resistance
- Essentially No Switching Losses
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note2)("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Typical Thermal Resistance: 0.38°C/W Junction to Case

Applications

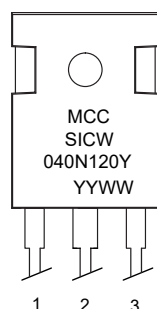
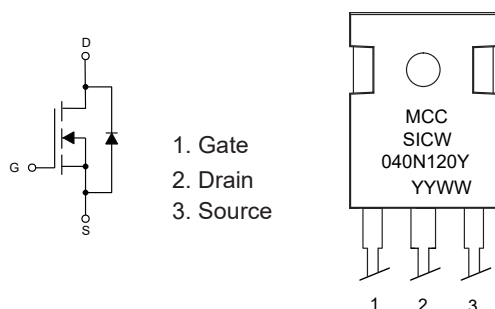
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	1200	V
Gate-Source Voltage		V_{GSmax}	-10/+25	V
Gate-Source Voltage		V_{GSop}	-5/+20	V
Continuous Drain Current $V_{GS}=20V$	$T_c=25^{\circ}C$	I_D	63	A
	$T_c=100^{\circ}C$		44	
Pulsed Drain Current (Note 3)		I_{DM}	160	A
Total Power Dissipation	$T_c=25^{\circ}C$	P_D	390	W
	$T_c=110^{\circ}C$		170	

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.
3. Pulse Test: Pulse Width Limited by T_{jmax} .

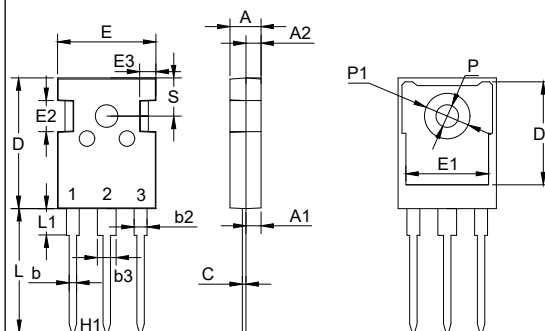
Internal Structure



Device Code: SICW040N120Y
Date Code: YYWW (Year & Week)

N-CHANNEL MOSFET

TO-247AB



DIMENSIONS

DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.189	0.205	4.80	5.20	
A1	0.087	0.103	2.21	2.61	
A2	0.073	0.085	1.85	2.15	
b	0.039	0.055	1.00	1.40	
b2	0.075	0.087	1.91	2.21	
C	0.020	0.028	0.50	0.70	
D	0.815	0.839	20.70	21.30	
D1	0.640	0.663	16.25	16.85	
E	0.610	0.634	15.50	16.10	
E1	0.512	0.535	13.00	13.60	
E2	0.189	0.205	4.80	5.20	
E3	0.091	0.106	2.30	2.70	
L	0.772	0.796	19.62	20.22	
L1	-	0.169	-	4.30	
P	0.134	0.150	3.40	3.80	Φ
P1		0.287	-	7.30	Φ
S	0.242		6.15		TYP
H1	0.214		5.44		TYP
b3	0.110	0.126	2.80	3.20	

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			100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V		1	10	μA
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =10mA	2.0	2.5	3.5	V
		V _{DS} =V _{GS} , I _D =10mA, T _j =175°C		2.0		V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =20V, I _D =40A		42	52	mΩ
		V _{GS} =20V, I _D =40A,T _j =175°C		72		mΩ
Internal Gate Resistance	R _g	f=1MHz		1.8		Ω
Transconductance	g _{FS}	V _{DS} =20V, I _D =40A		18		S
		V _{GS} =20V, I _D =40A,T _j =175°C		17		
Diode Characteristics						
Continuous Body Diode Current ^(Note4)	I _S	T _C =25°C		60		A
Diode Forward Voltage	V _{SD}	V _{GS} =-5V, I _{SD} =20A		4.0		V
		V _{GS} =0V, I _{SD} =20A, T _j =175°C		3.4		V
Reverse Recovery Time	t _{rr}	V _{GS} =-5V, I _{SD} =40A, V _R =800V, dI _F /dt=1000A/μs		54		ns
Reverse Recovery Charge	Q _{rr}			283		nC
Peak Reverse Recovery Current	I _{rrm}			15		A
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =1000V,V _{GS} =0V,f=1MHz		2225		pF
Output Capacitance	C _{oss}			141		
Reverse Transfer Capacitance	C _{rss}			15		
Coss Stored Energy	E _{oss}			78		μJ
Total Gate Charge	Q _g	V _{DS} =800V,V _{GS} =-5/+20V I _D =40A		120		nC
Gate-Source Charge	Q _{gs}			34		
Gate-Drain Charge	Q _{gd}			42		
Turn-On Delay Time	t _{d(on)}	V _{DD} =800V, V _{GS} =-5/+20V, R _G =2.5Ω, I _{DS} =40A, L=99μH		13		ns
Turn-On Rise Time	t _r			61		
Turn-Off Delay Time	t _{d(off)}			25		
Turn-Off Fall Time	t _f			13		
Turn-On switching energy	E _{on}			1.5		mJ
Turn-Off switching energy	E _{off}			0.3		

Note 4: When using SiC Body Diode the maximum recommended $V_{GS}=-5V$

Curve Characteristics

Fig. 1 - Typical Output Characteristic($T_J = -55^\circ\text{C}$)

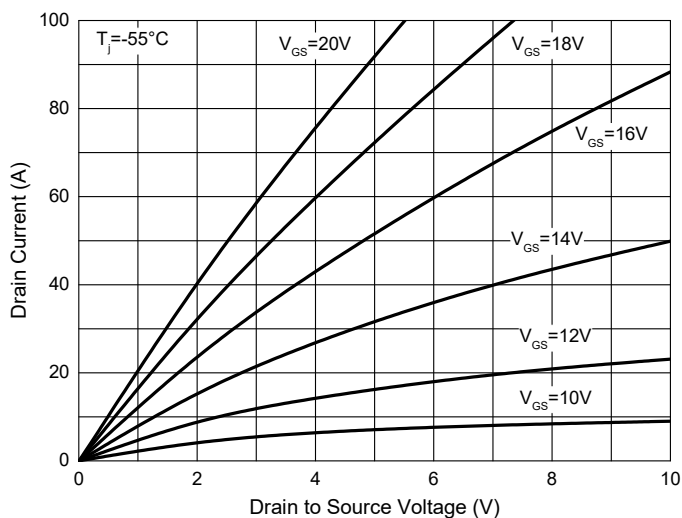


Fig. 2 - Typical Output Characteristic ($T_J = 25^\circ\text{C}$)

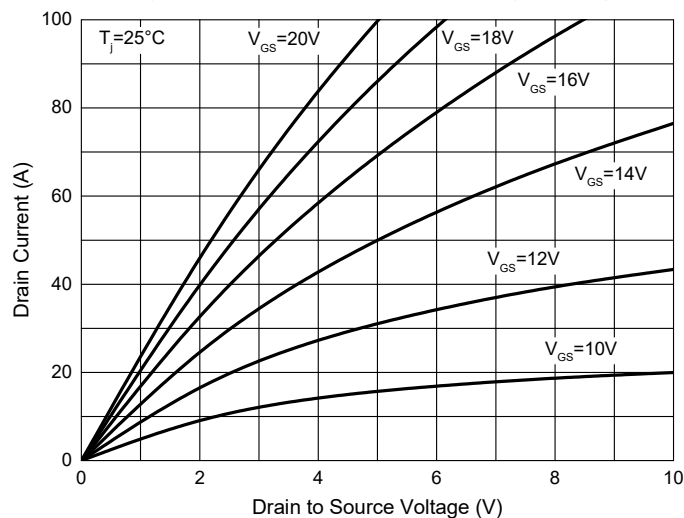


Fig. 3 - Typical Output Characteristic ($T_J = 175^\circ\text{C}$)

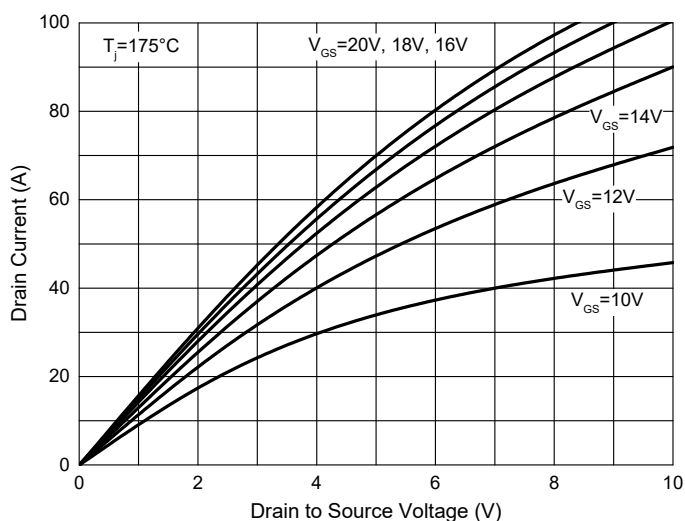


Fig. 4 - Typical Transfer Characteristic

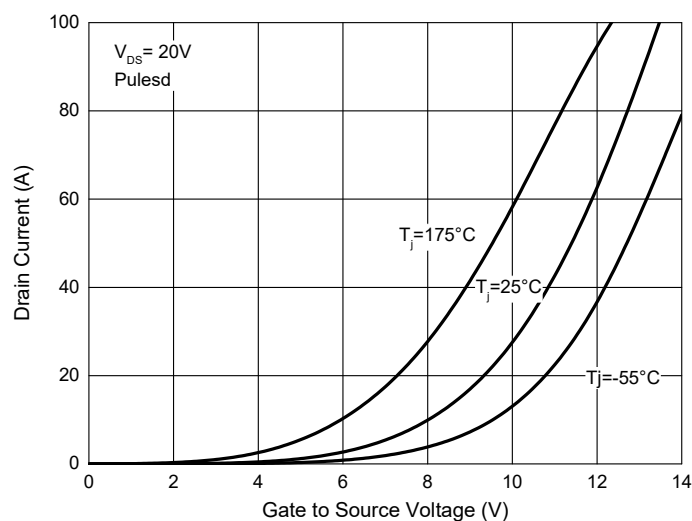


Fig. 5 On-Resistance vs Temperature

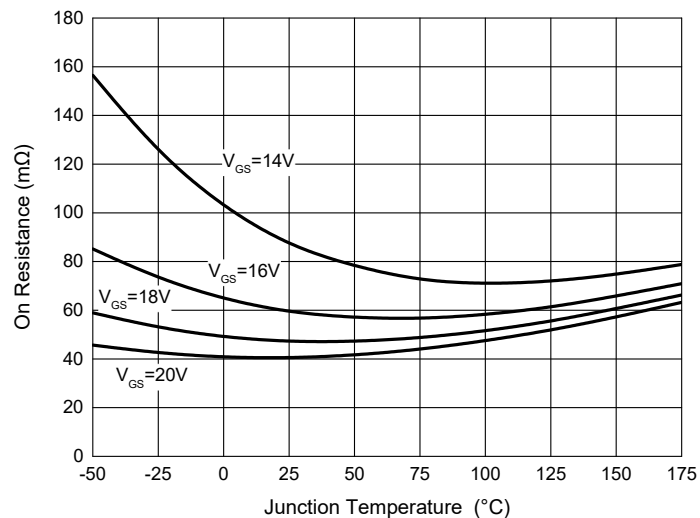
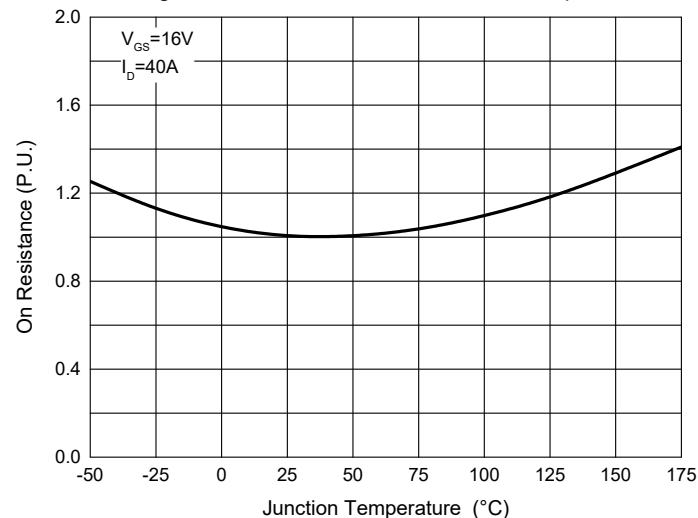


Fig. 6 - Normalized On-Resistance vs Temperature



Curve Characteristics

Fig. 7 - On-Resistance vs Drain Current

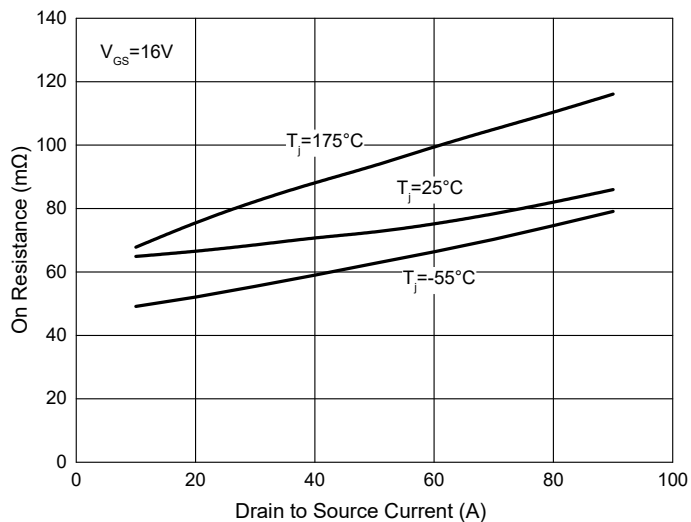


Fig. 8 - Body Diode Characteristic

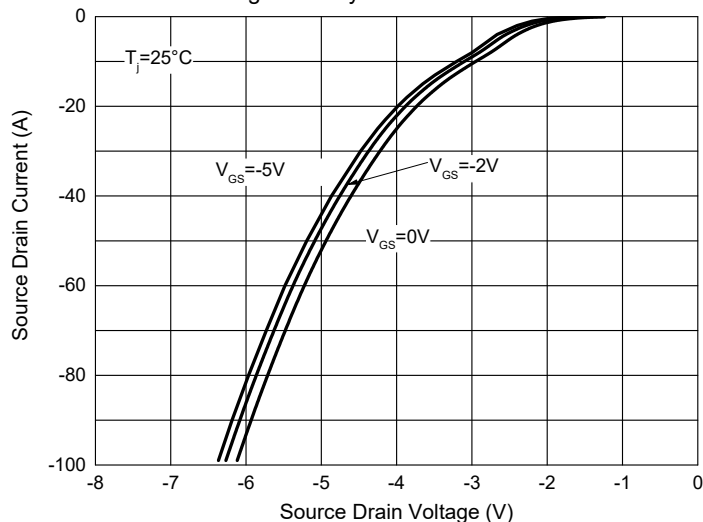


Fig. 9 - Body Diode Characteristic

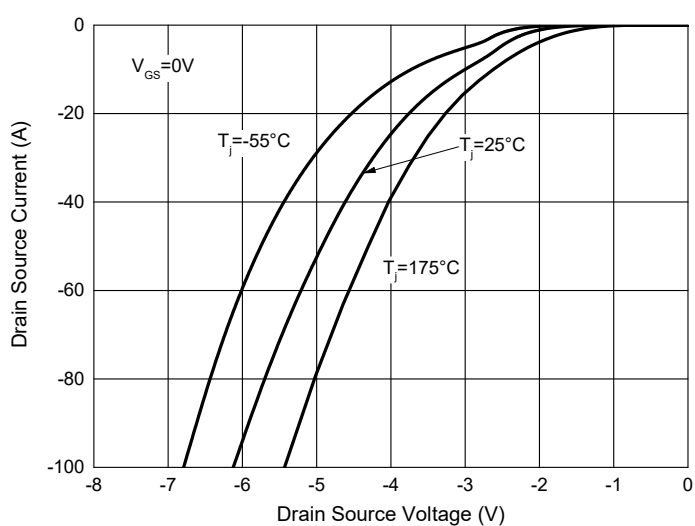


Fig. 10 - 3rd Quadrant Characteristic

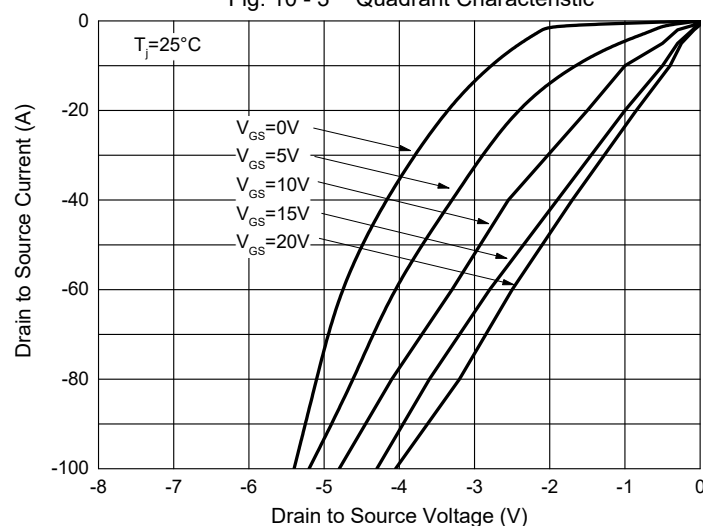


Fig. 11 - Threshold Voltage vs Temperature

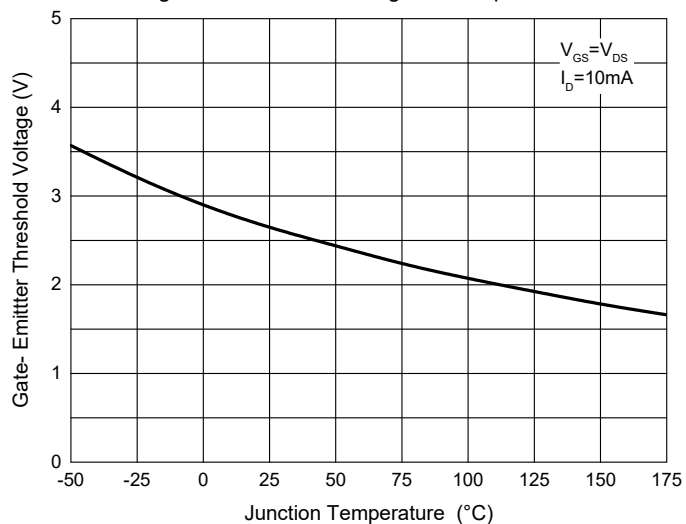
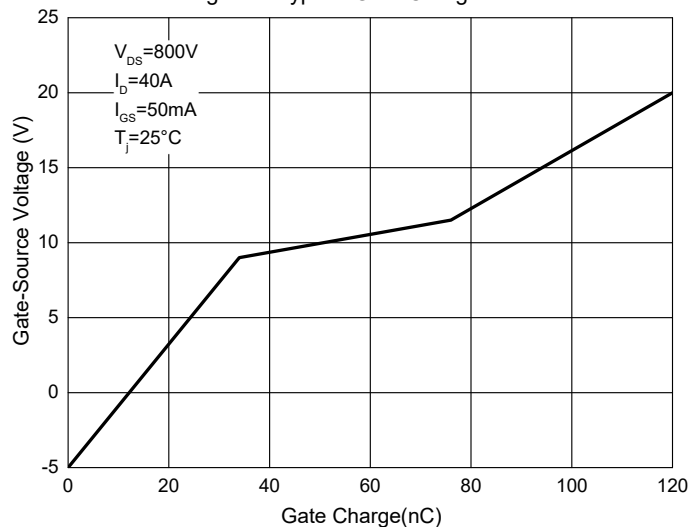


Fig. 12 - Typical Gate Charge



Curve Characteristics

Fig. 13 - Capacitance Characteristics

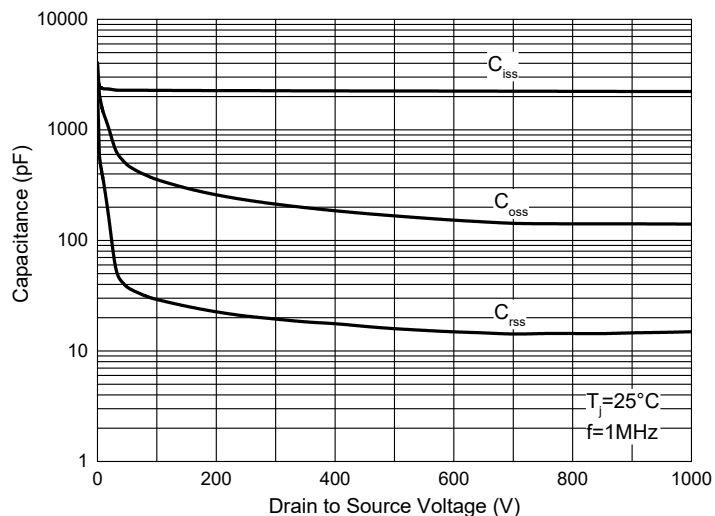


Fig. 14 - Capacitance Characteristics

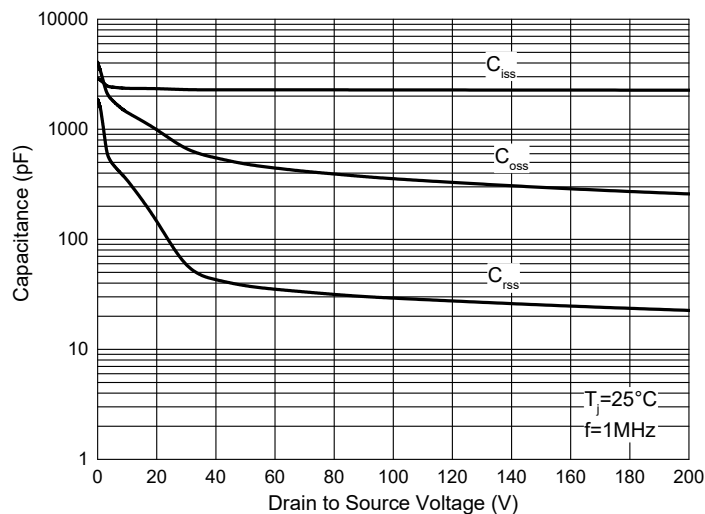


Fig. 15 - Output capacitor stored energy

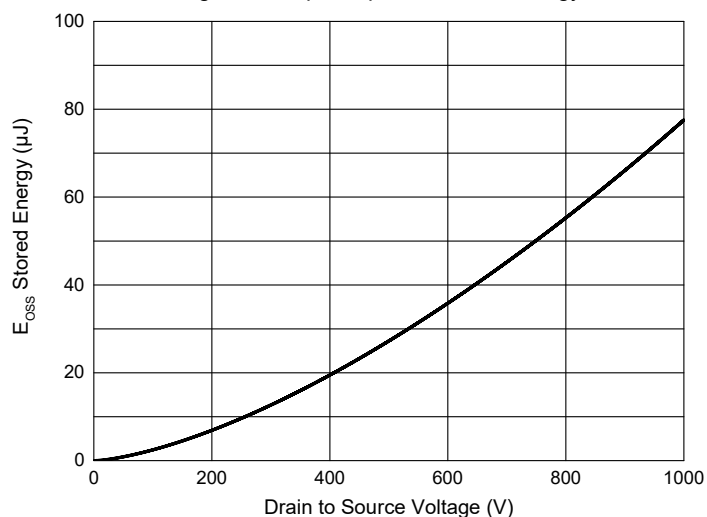


Fig. 16 - Reverse Characteristics vs Temperature

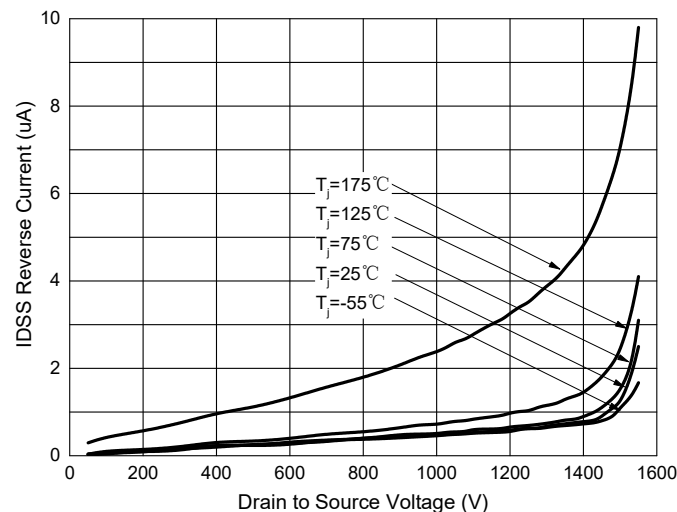


Fig. 17 - Clamped Inductive Switching Energy vs I_D

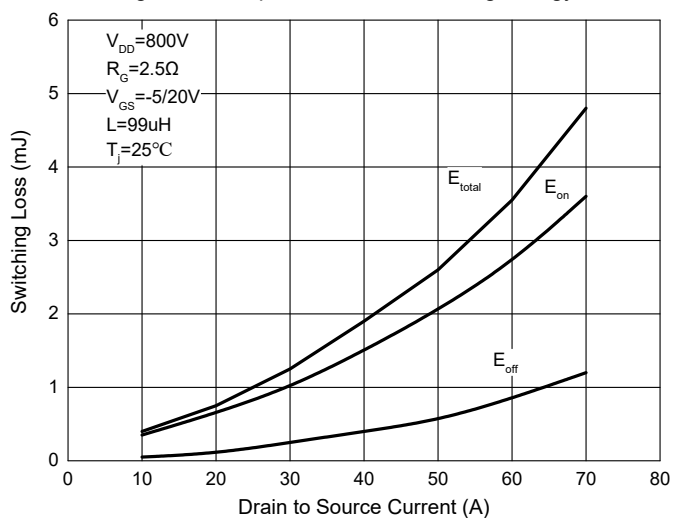
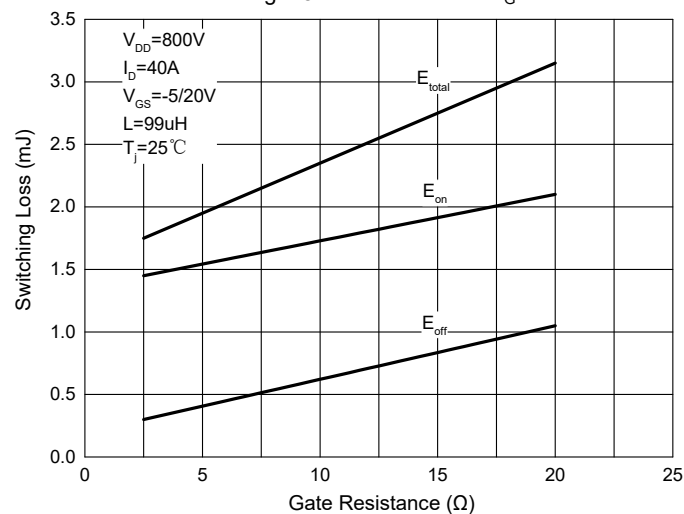


Fig. 18 - Switch Loss vs R_G



Curve Characteristics

Fig. 19 - Switching Times vs Gate Resistance

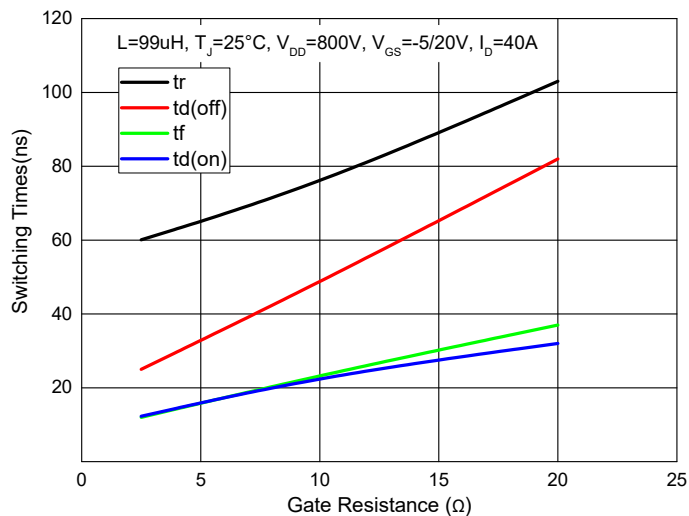


Fig. 20 - Drain Current Derating vs Case Temperature

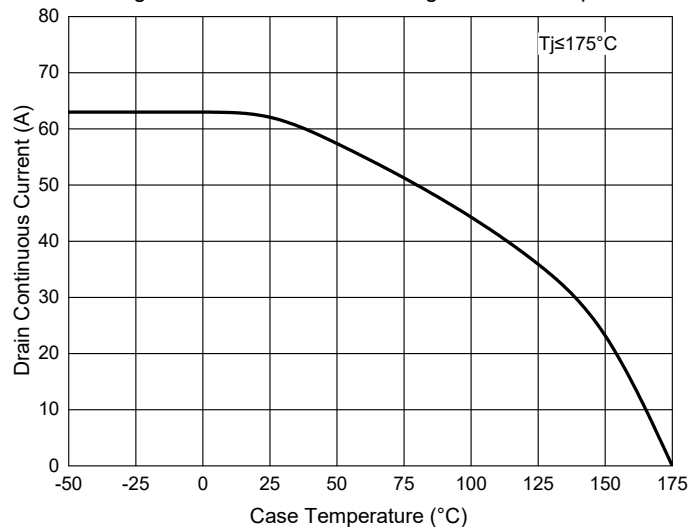


Fig. 21 - Transient Thermal Impedance

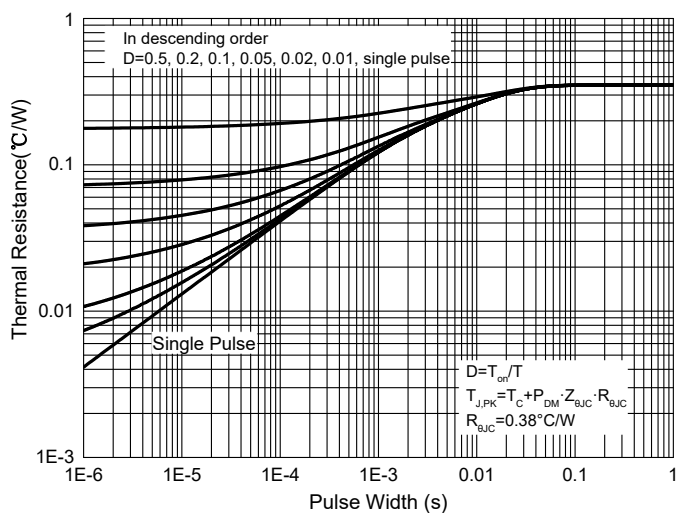


Fig. 22 - Safe Operation Area

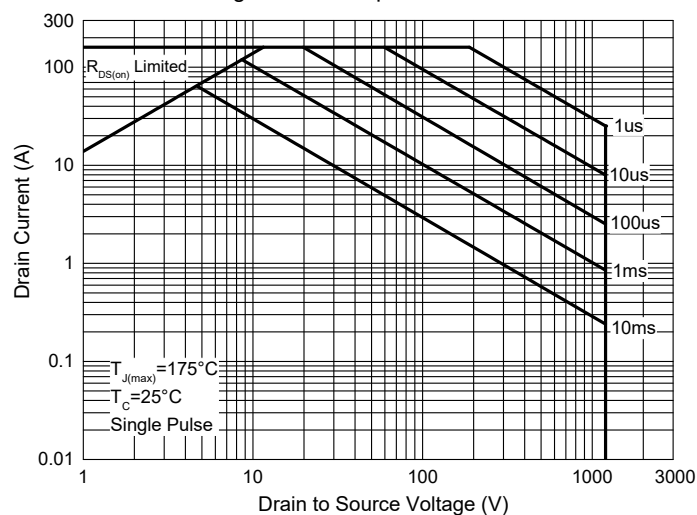
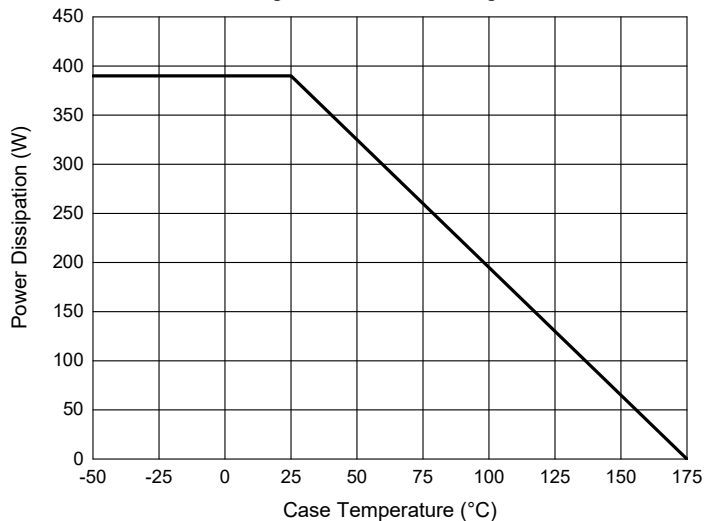


Fig. 23 - Power Derating



Ordering Information

Device	Packing
SICW040N120Y-BP	Tube:30pcs/Tube, 360pcs/Box,1.8K/Ctn;

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