

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 Ambient,Max(Note 3): 62°C/W
- Thermal Resistance Junction to Case,Typ : 0.4°C/W

Applications

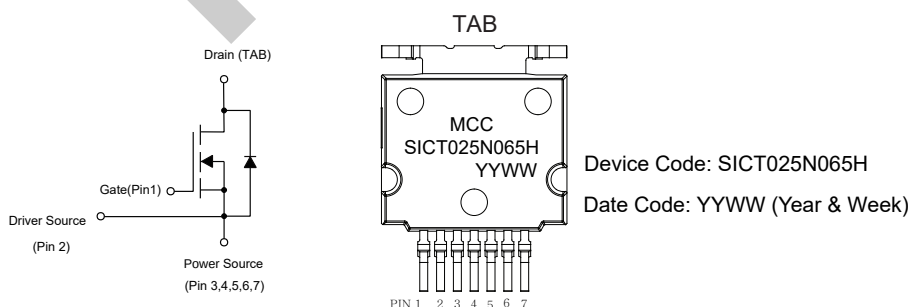
- Solar Inverters
- Uninterruptible Power Supply
- Photovoltaic Inverter
- Battery Chargers
- Motor Drives

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V _{DS}	650	V
Gate-Source Voltage ^(Note 4)		V _{GSmax}	-10/+22	V
Gate-Source Voltage		V _{GSop}	-5/+18	V
Continuous Drain Current V _{GS} =18V	T _C =25°C	I _D	107	A
	T _C =110°C		72	
Pulsed Drain Current ^(Note 5)		I _{DM}	305	A
Total Power Dissipation	T _C =25°C	P _D	375	W
	T _C =110°C		162	
Avalanche Energy, Single Pulse	V _{DD} =100V, I _D =14A	E _{AS}	3.2	J

Note:

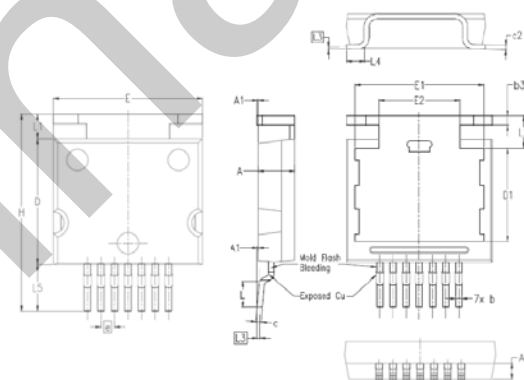
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.
3. Device mounted on 1 in2 FR-4 board with 2oz. single-sided Copper, in a still air environment with $T_A=25^\circ C$.
4. AC $f > 1Hz$, duty cycle < 1%.
5. Pulse Test: Pulse Width Limited by T_{jmax} .

Internal Structure and Marking Code



SiC N-CHANNEL MOSFET

T2PAK



DIMENSIONS

DIM	INCHES		mm		NOTE
	MIN	MAX	MIN	MAX	
A	0.130	0.146	3.30	3.70	
A1	-	0.010	-	0.25	
A2	0.051	0.067	1.30	1.70	
b	0.020	0.028	0.50	0.70	
b3	0.031	0.039	0.80	1.00	
c	0.016	0.024	0.40	0.60	
c2	0.016	0.024	0.40	0.60	
D	0.461	0.469	11.70	11.90	
D1	0.346	0.362	8.80	9.20	
E	0.535	0.567	13.60	14.40	
E1	0.472	0.504	12.00	12.80	
E2	0.299	0.315	7.60	8.00	
e	0.050		1.27		
H	0.697	0.760	17.70	19.30	
L	0.075	0.122	1.90	3.10	
L1	0.091		2.30		
L2	0.112	0.132	2.85	3.35	
L3	0.010		0.25		
L4	0.049	0.096	1.25	2.45	
L5	0.173		4.40		

Electrical Characteristics @ $T_J=25^{\circ}\text{C}$ (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=100\mu A$	650			V
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=18V$			250	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			100	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=50mA$	2	3.1	4.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=50A$		25	30	m Ω
		$V_{GS}=18V, I_D=50A, T_J=175^{\circ}\text{C}$		35		m Ω
Internal Gate Resistance	R_g	$f=1MHz, V_{AC}=25mV$		0.6		Ω
Transconductance	g_{FS}	$V_{DS}=10V, I_D=60A$		18.2		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=400V, V_{GS}=0V, f=1MHz, V_{AC}=25mV$		5740		pF
Output Capacitance	C_{oss}			358		
Reverse Transfer Capacitance	C_{rss}			47		
Coss Stored Energy	E_{oss}			34		μJ
Total Gate Charge	Q_g	$V_{DS}=400V, V_{GS}=-5/+18V, I_D=50A$		275		nC
Gate-Source Charge	Q_{gs}			80		
Gate-Drain Charge	Q_{gd}			75		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=400V, V_{GS}=-4/+18V, R_G=2.7\Omega, I_D=50A, L=50\mu H$		46.5		ns
Rise Time	t_r			37		
Turn-Off Delay Time	$t_{d(off)}$			52		
Fall Time	t_f			19.5		
Turn-On switching energy	E_{on}	$V_{DS}=400V, V_{GS}=-4/+18V, R_G=2.7\Omega, I_D=50A, L=50\mu H$		740		μJ
Turn-Off switching energy	E_{off}			229		
Short-Circuit Withstand Time	t_{SC}	$V_{GS}=0/15V, V_{DS}=400V, R_G=100\Omega$		<18		μs
Diode Characteristics						
Continuous Body Diode Current	I_S	$V_{GS}=0V, T_C=25^{\circ}\text{C}$		61.5		A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=10A$		2.9		V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_{SD}=30A, V_{DS}=400V, dI_F/dt=300A/\mu s$		40		ns
Reverse Recovery Charge	Q_{rr}			125		nC
Peak Reverse Recovery Current	I_{rrm}			4.9		A

Curve Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 1 - Typical Output Characteristic ($T_J=25^\circ\text{C}$)

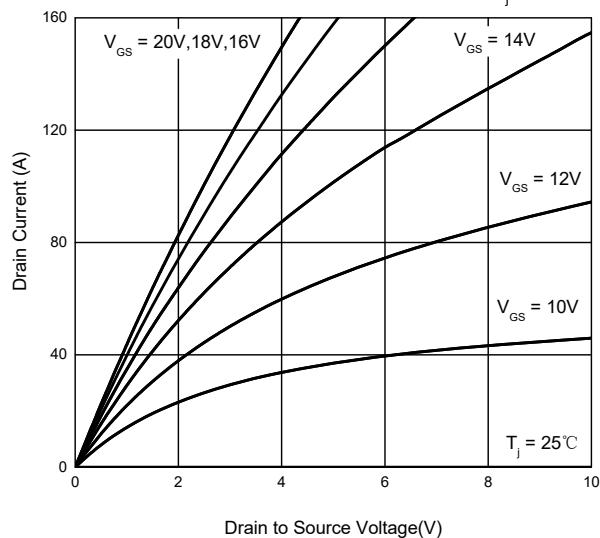


Fig. 2 - Typical Output Characteristic ($T_J=175^\circ\text{C}$)

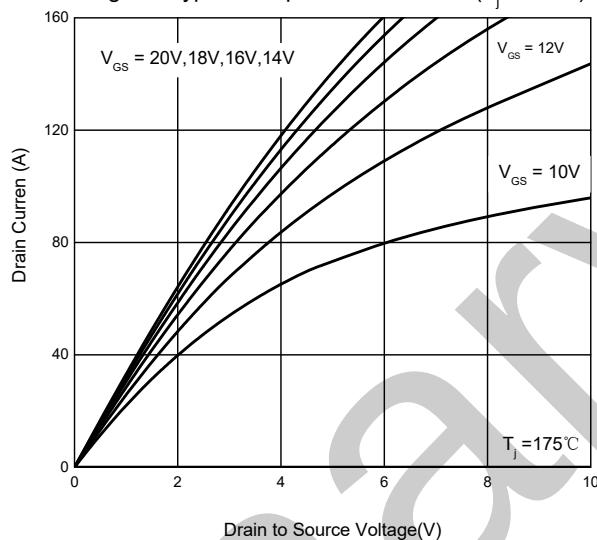


Fig. 3 - On-Resistance vs. Drain Current

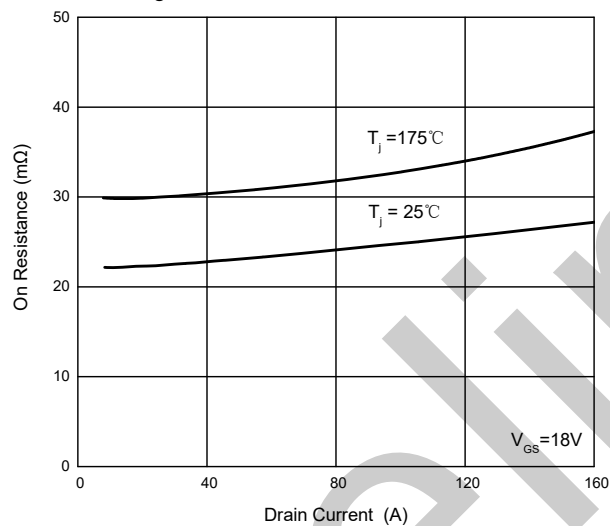


Fig. 4 - Typical Transfer Characteristic

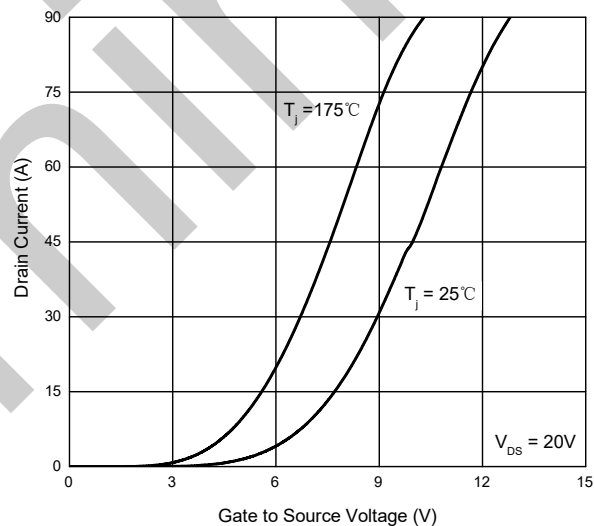


Fig. 5 - On-Resistance vs. Gate Voltage

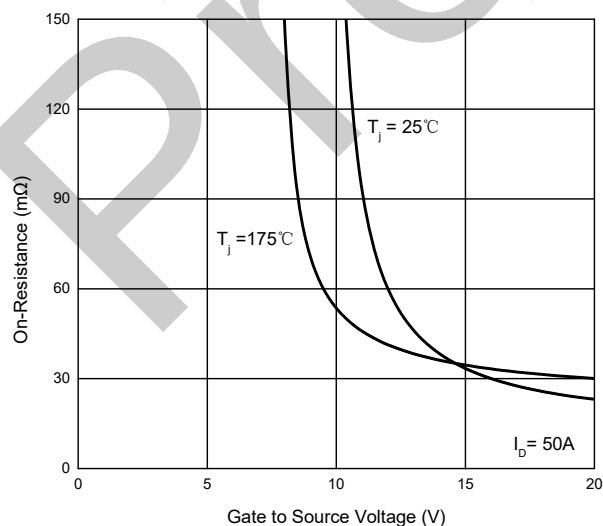
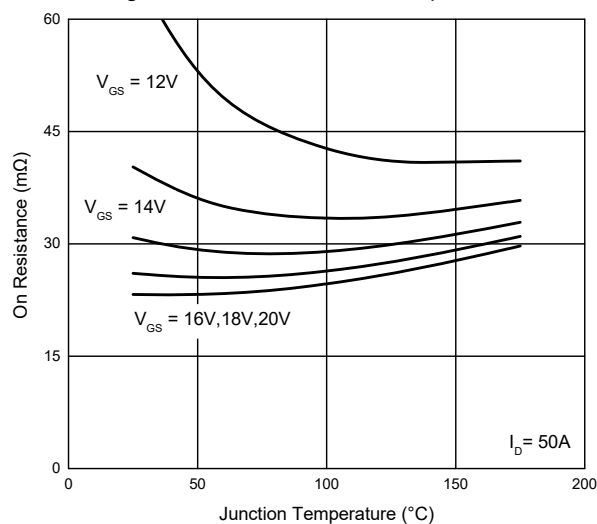


Fig. 6 - On-Resistance vs. Temperature



Curve Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 7 - Normalized On-Resistance vs. Temperature

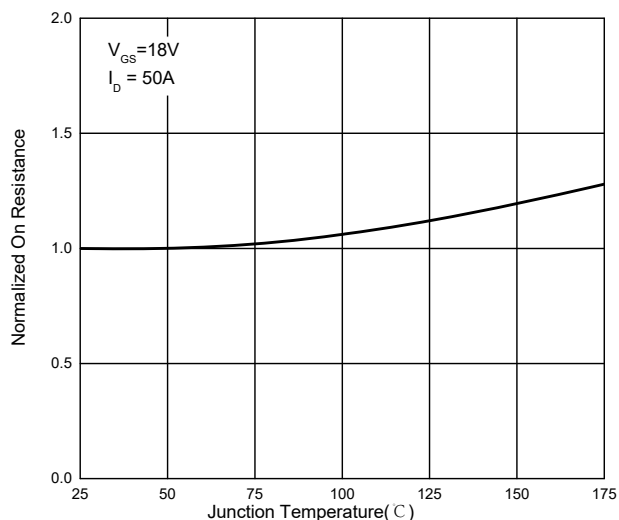


Fig. 8 - Reverse Output Voltage

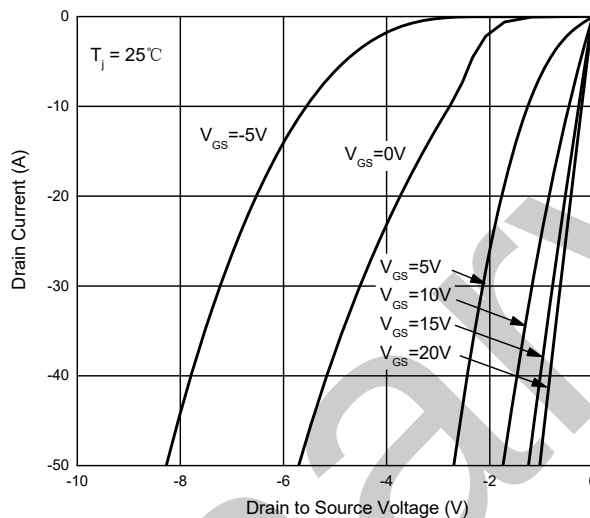


Fig. 9 - Reverse Output Voltage

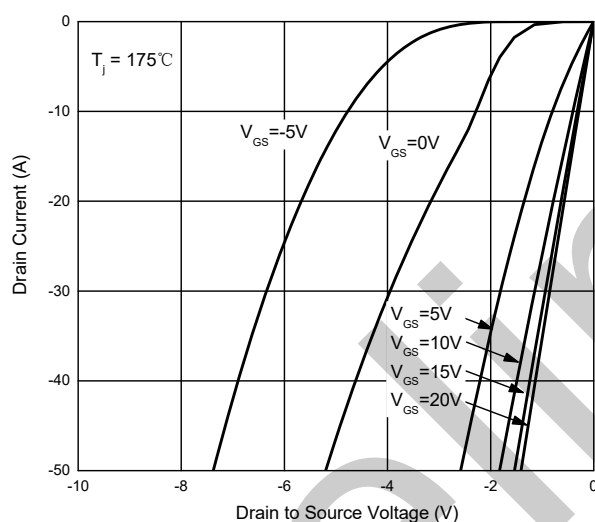


Fig. 10 - Capacitances vs. V_{DS}

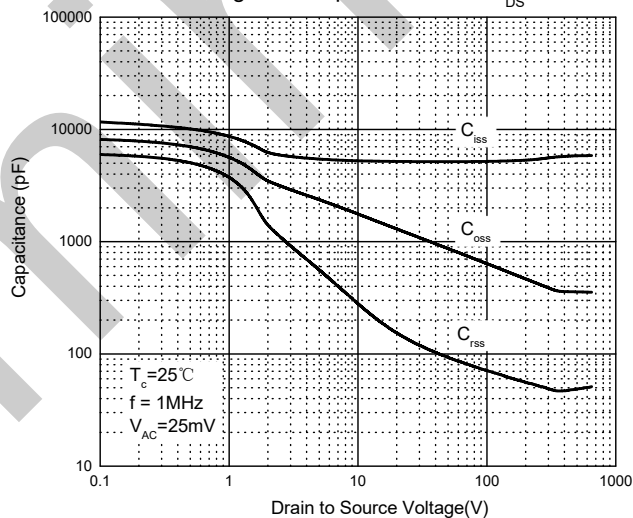


Fig. 11 - Threshold Voltage vs. Temperature

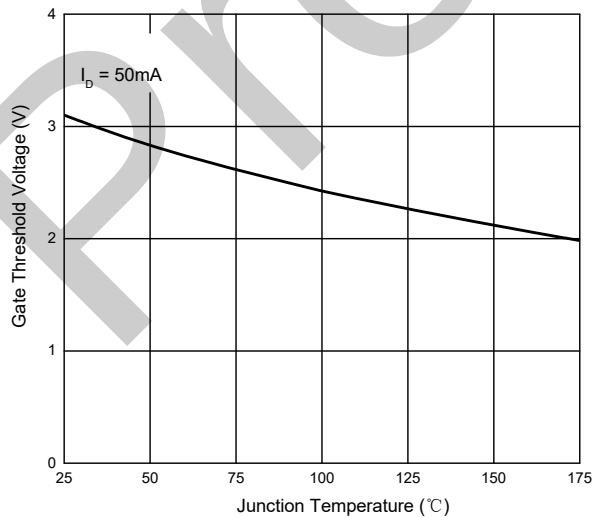
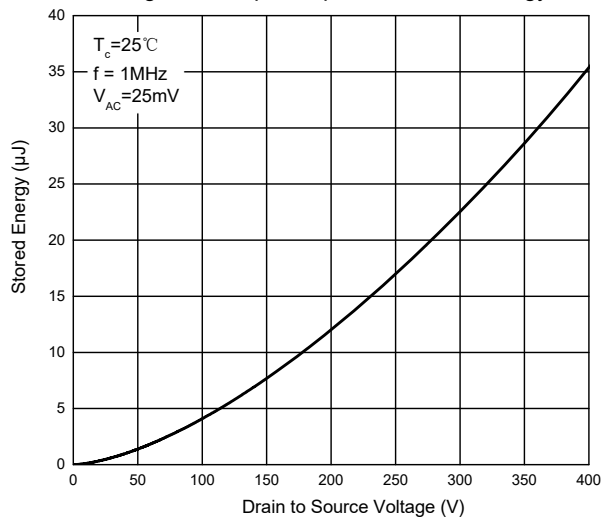


Fig. 12 - Output Capacitor Stored Energy



Curve Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig. 13 - Power Derating

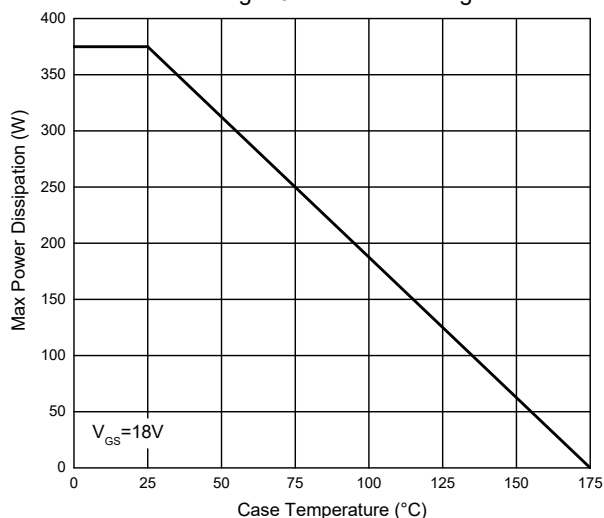


Fig. 14 - Drain Current Derating

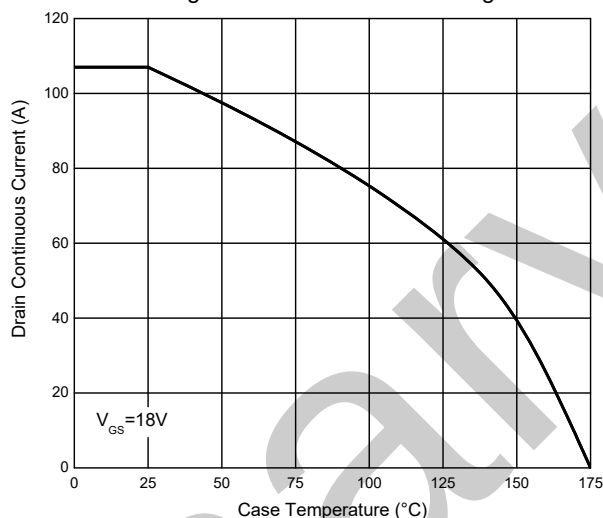


Fig. 15 - Safe Operation Area

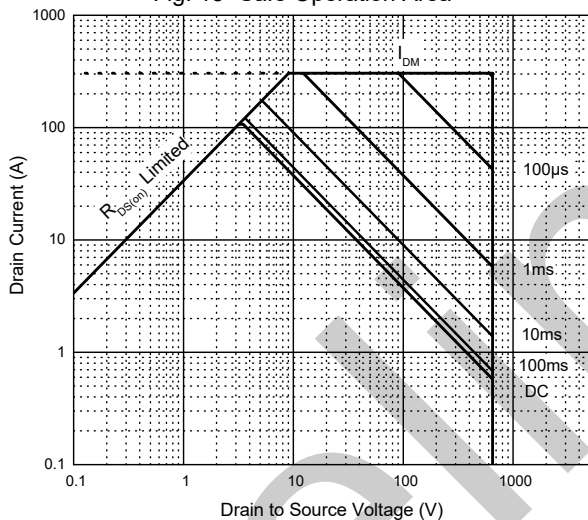


Fig. 16 - Typical Gate Charge

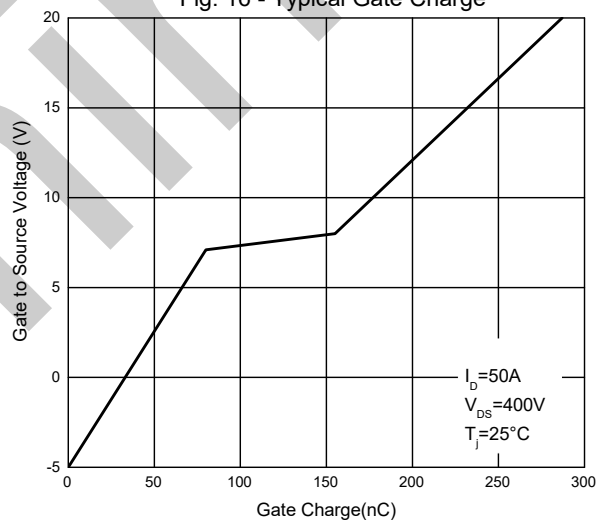


Fig. 17 - Clamped Inductive Switching Energy vs. Drain Current

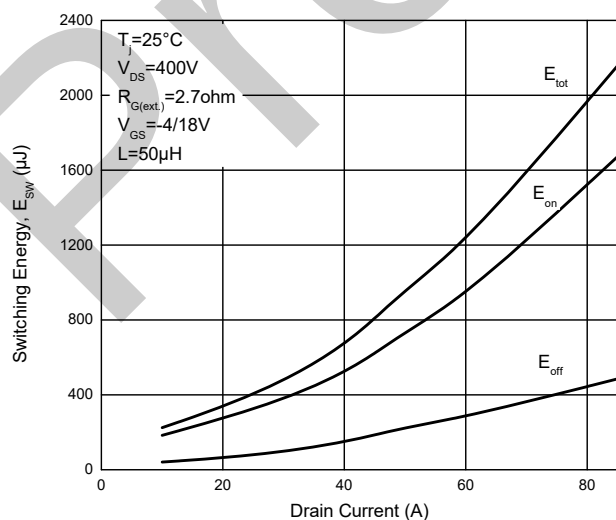
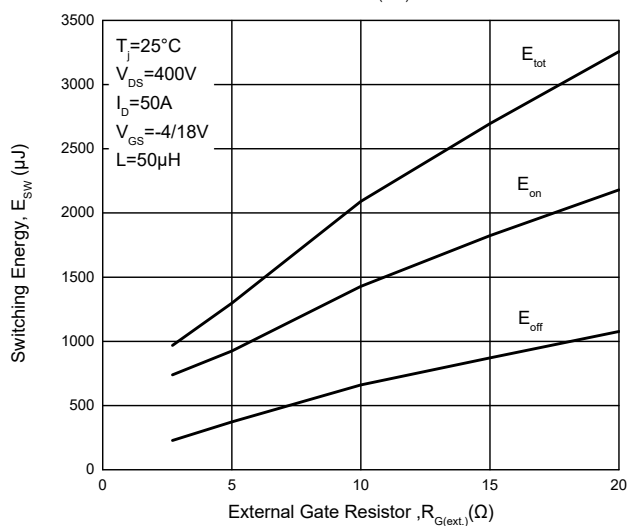
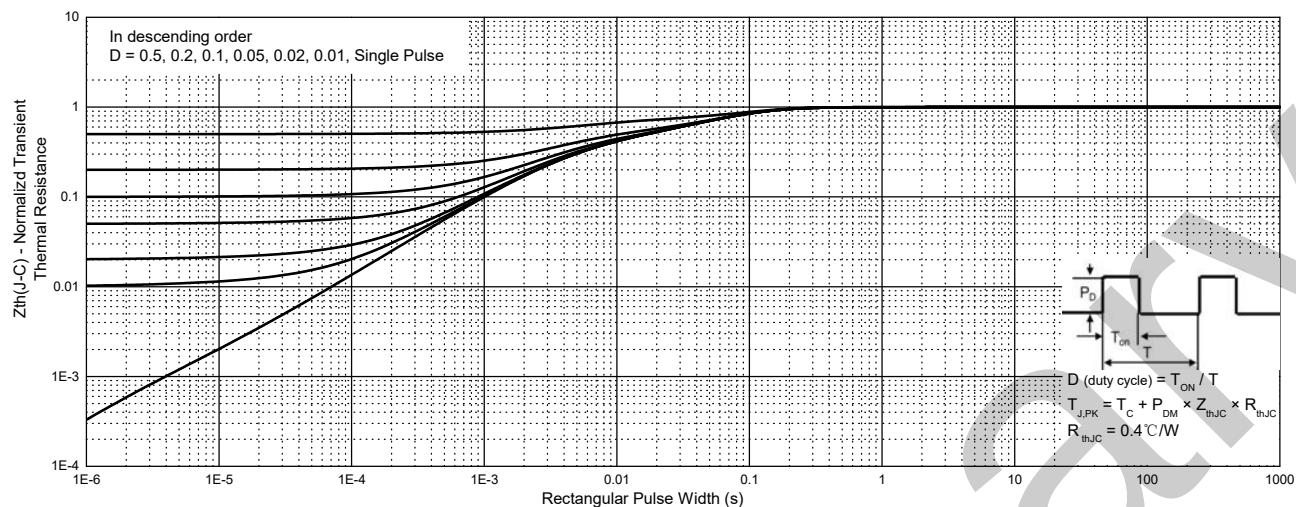


Fig. 18 - Clamped Inductive Switching Energy vs. External Gate Resistor ($R_{G(ext)}$)



Curve Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Fig.19 - Normalized Transient Thermal Impedance



Ordering Information

Device	Packing
SICT025N065H-TP	700pcs/Reel

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