

Features

- SiC MOSFET Technology
- High Blocking Voltage with Low On-resistance
- Low Capacitance
- 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: 1.2°C/W Junction to Case

Applications

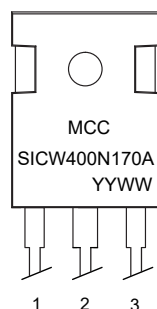
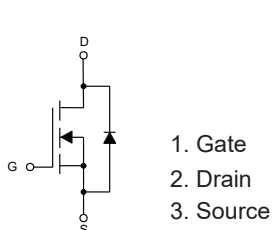
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Power Factor Correction (PFC)
- Motor Drives

Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	V_{DS}	1700	V	
Gate-Source Voltage	V_{GSmax}	-5/+25	V	
Gate-Source Voltage	V_{GSop}	-3/+20	V	
Continuous Drain Current $V_{GS}=20V$	I_D	$T_c=25^\circ C$	6	A
		$T_c=110^\circ C$	3.9	
Pulsed Drain Current (Note 3)	I_{DM}	24	A	
Single Pulse Avalanche Energy (Note4)	E_{AS}	259	mJ	
Total Power Dissipation	P_D	$T_c=25^\circ C$	125	W
		$T_c=110^\circ C$	54	

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} .
4. EAS Condition: $T_j=25^\circ C$, $V_{DD}=50V$, $V_{GS}=20V$, $R_g=25\Omega$, $L=10mH$, $I_{AS}=7.2A$.

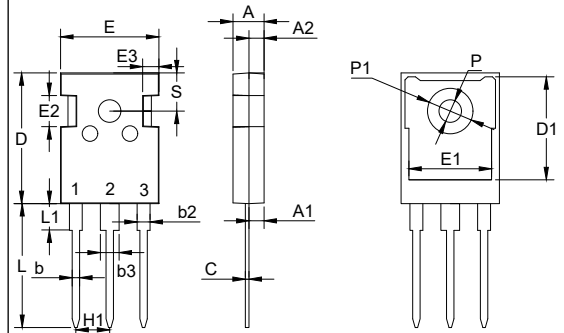
Internal Structure



Device Code: SICW400N170A
Date Code: YYWW (Year & Week)

N-CHANNEL MOSFET

TO-247AB



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	-	4.50	
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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	1700			V
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=20V$			±250	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=1700V, V_{GS}=0V$			10	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=5mA$	2		4.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=20V, I_D=3A$		400	500	mΩ
		$V_{GS}=18V, I_D=3A$		440	550	mΩ
		$V_{GS}=16V, I_D=3A$		520	650	mΩ
Internal Gate Resistance	R_g	f=1MHz		3		Ω
Diode Characteristics						
Continuous Body Diode Current	I_S	$V_{GS}=-3V$		6		A
Diode Forward Voltage	V_{SD}	$V_{GS}=-3V, I_{SD}=1A$		4.2		V
Reverse Recovery Time	t_{rr}	$V_{GS}=-3/+20V, I_{SD}=6A,$ $V_R=400V, di_f/dt=100A/\mu s$		17		ns
Reverse Recovery Charge	Q_{rr}		5		nC	
Peak Reverse Recovery Current	I_{rrm}		0.6		A	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=1000V, V_{GS}=0V, f=1MHz$		333		pF
Output Capacitance	C_{oss}		19			
Reverse Transfer Capacitance	C_{rss}		4			
Total Gate Charge	Q_g	$V_{DS}=800V, V_{GS}=-3/+20V$ $I_D=6A$		31		nC
Gate-Source Charge	Q_{gs}		2.2			
Gate-Drain Charge	Q_{gd}		16			
Gate Plateau Voltage	V_{pl}		6		V	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=800V, V_{GS}=-3/+20V,$ $R_{G(ext)}=25\Omega, I_{DS}=6A$		34		ns
Turn-On Rise Time	t_r		22			
Turn-Off Delay Time	$t_{d(off)}$		39			
Turn-Off Fall Time	t_f		34			

Curve Characteristics

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

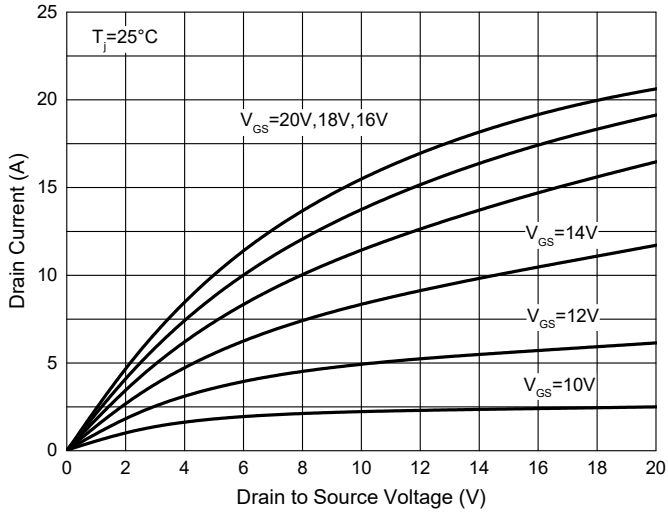


Fig. 2 - Typical Output Characteristic ($T_J=175^\circ\text{C}$)

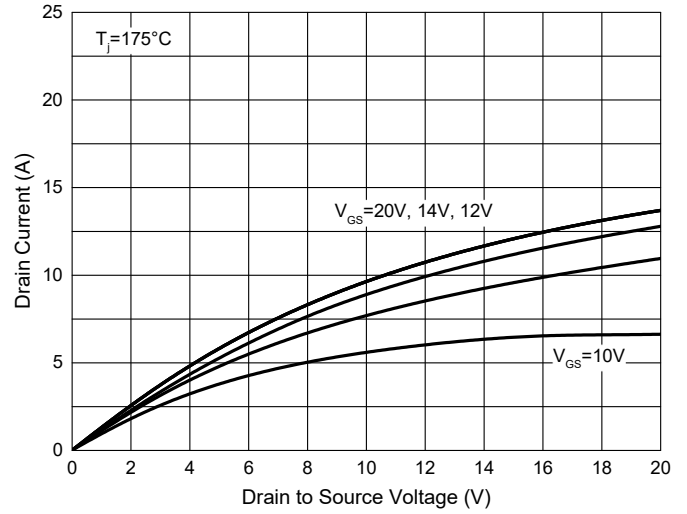


Fig. 3 - Typical Transfer Characteristic

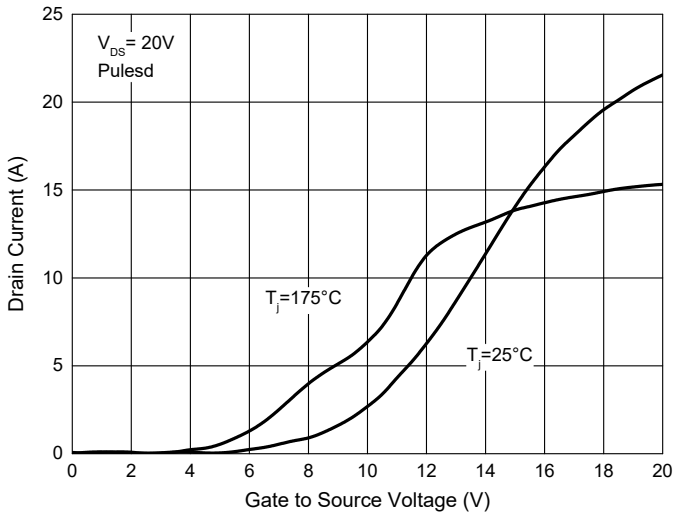


Fig. 4 - On-Resistance vs. Drain Current

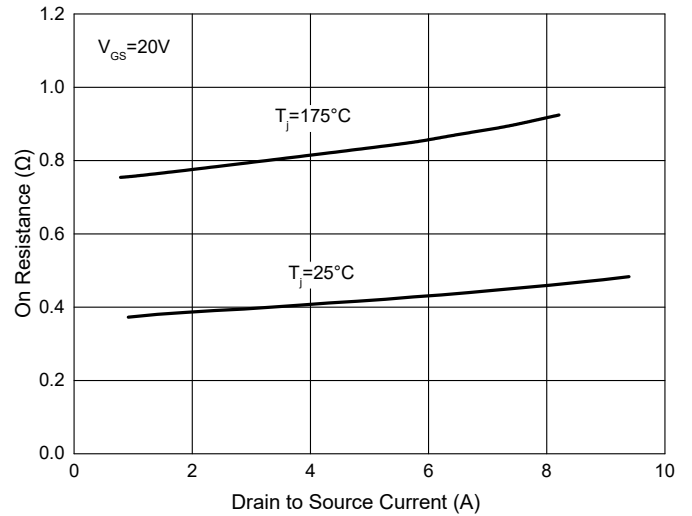


Fig. 5 On-Resistance vs Gate Voltage

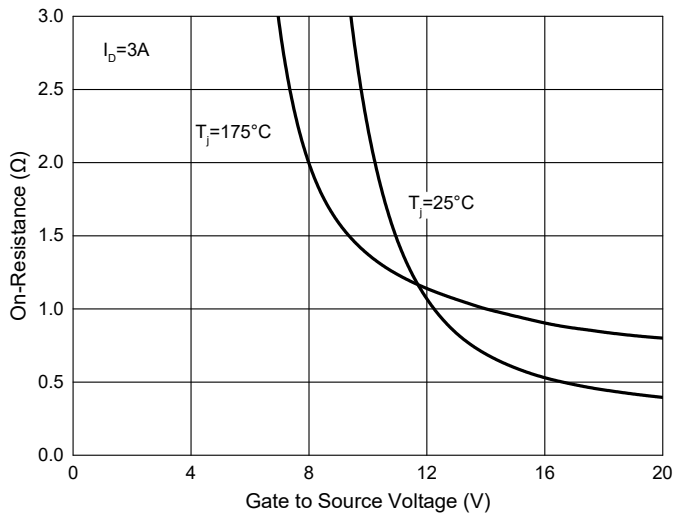
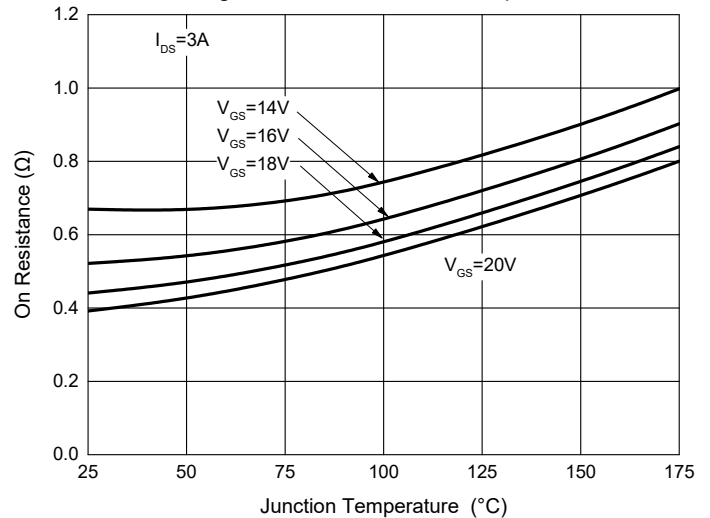


Fig. 6 - On-Resistance vs Temperature



Curve Characteristics

Fig. 7 - Normalized On-Resistance vs Temperature

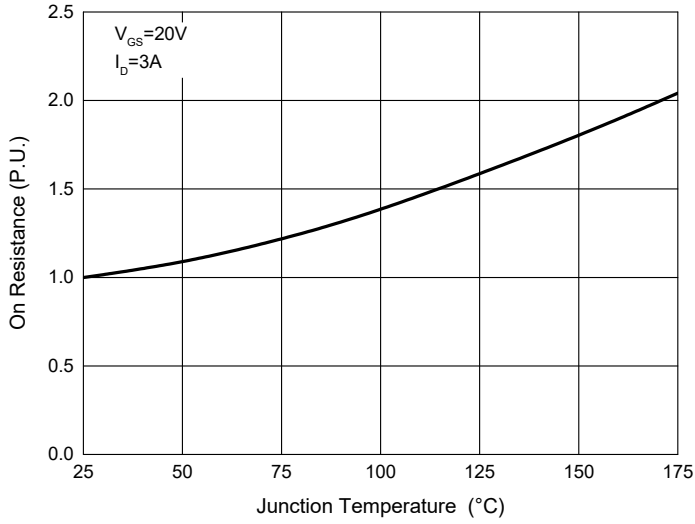


Fig. 8 - Body Diode Characteristic

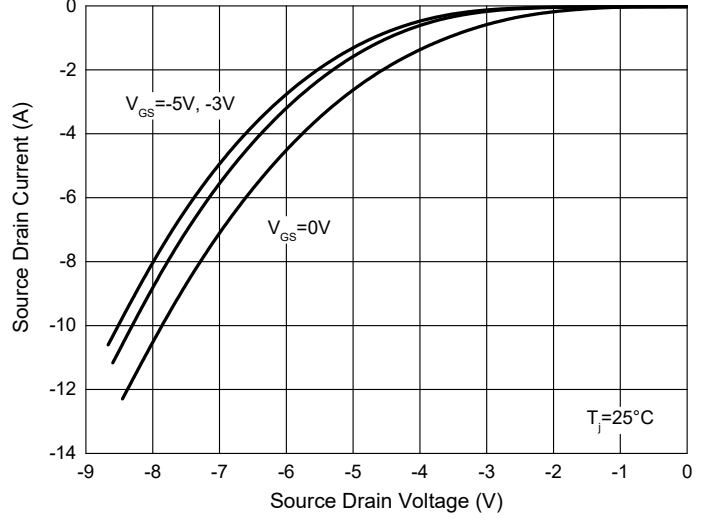


Fig. 9 - Body Diode Characteristic

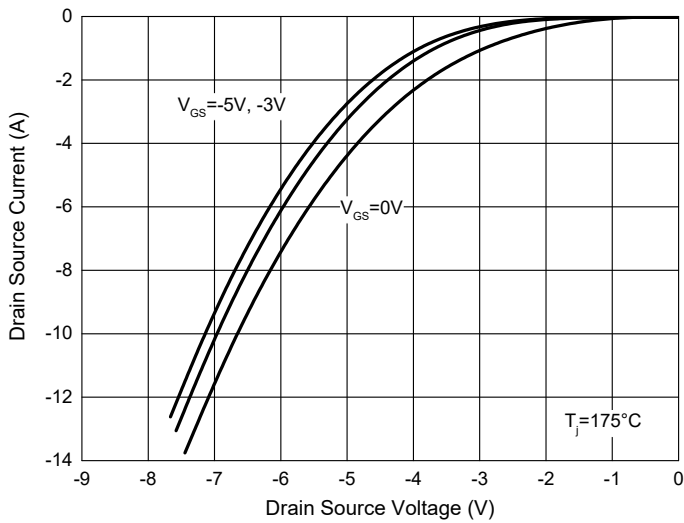


Fig. 10 - Output capacitor stored energy

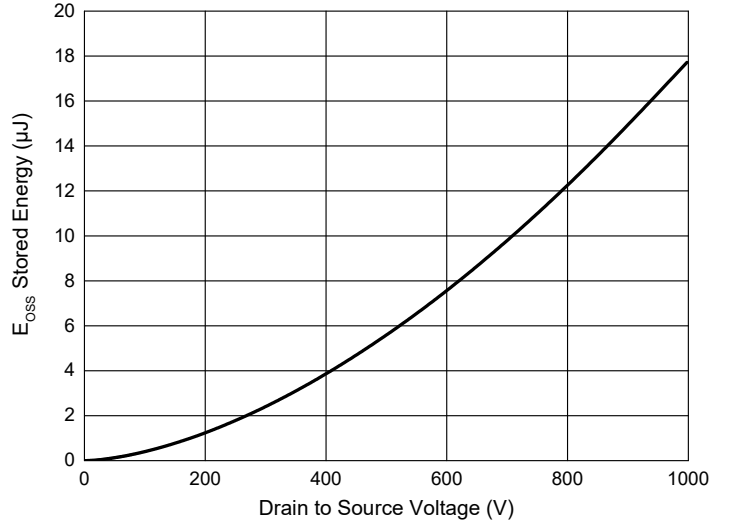


Fig. 11 - Threshold Voltage vs Temperature

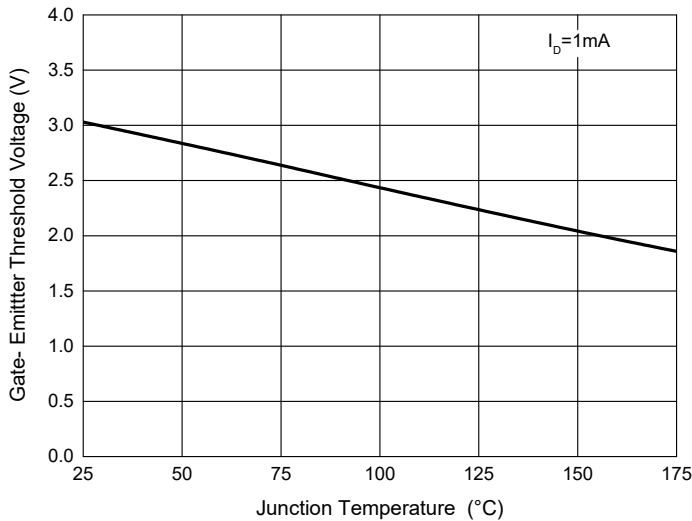
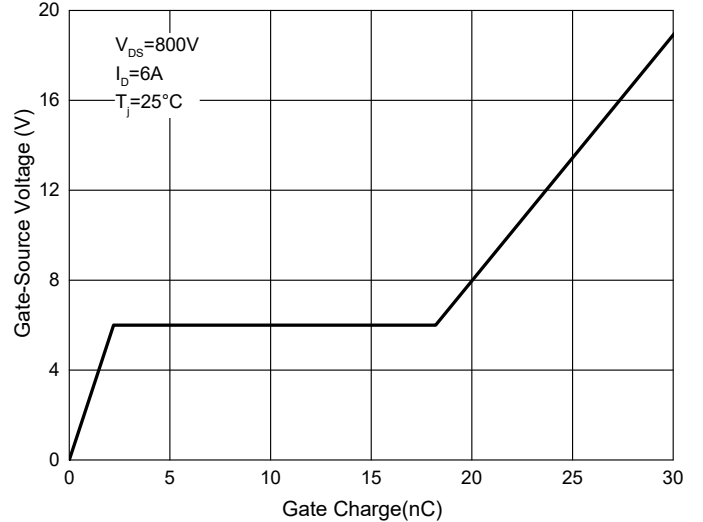


Fig. 12 - Typical Gate Charge



Curve Characteristics

Fig. 13 - Capacitance Characteristics

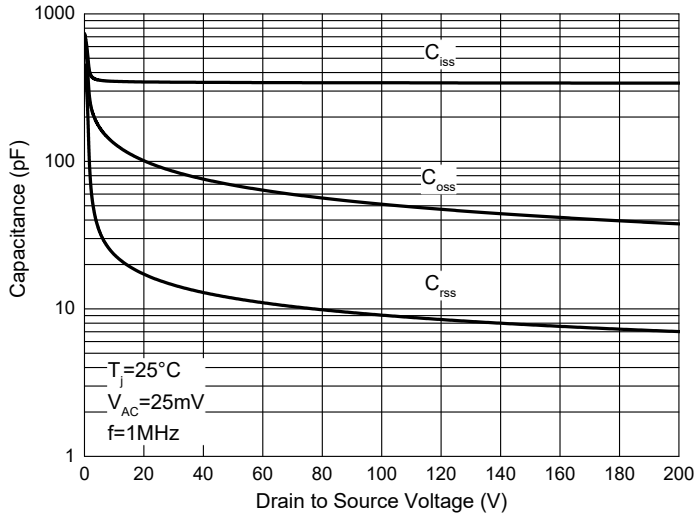


Fig. 14 - Capacitance Characteristics

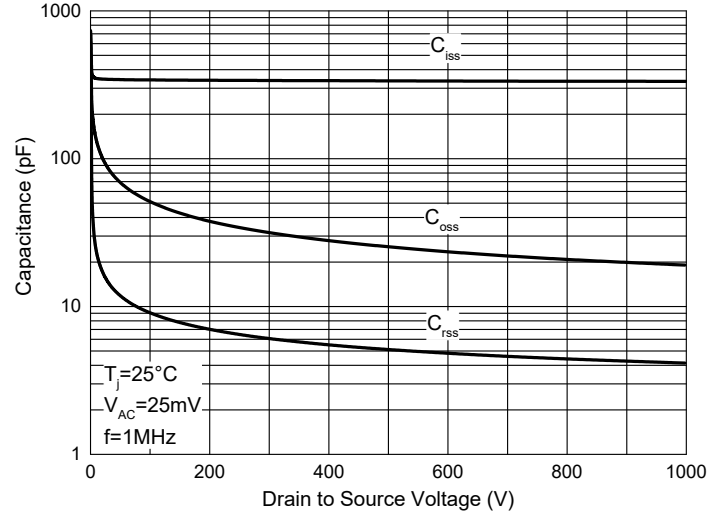


Fig. 15 - Drain Current Derating vs Case Temperature

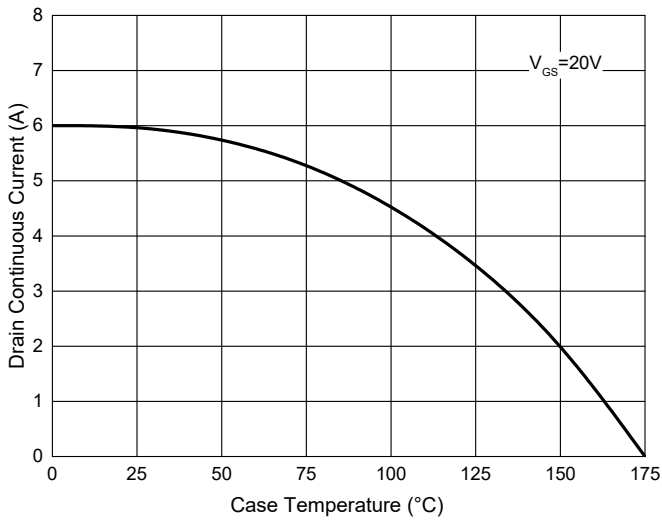


Fig. 16 - Junction to Case Transient Thermal Impedance

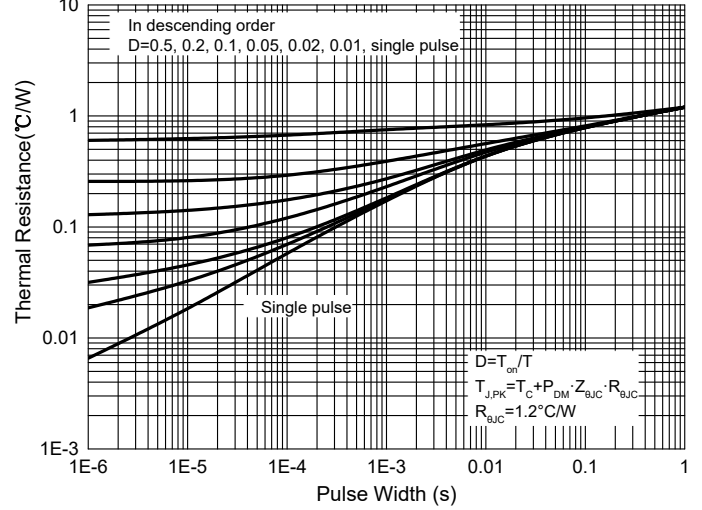


Fig. 17 - Safe Operation Area

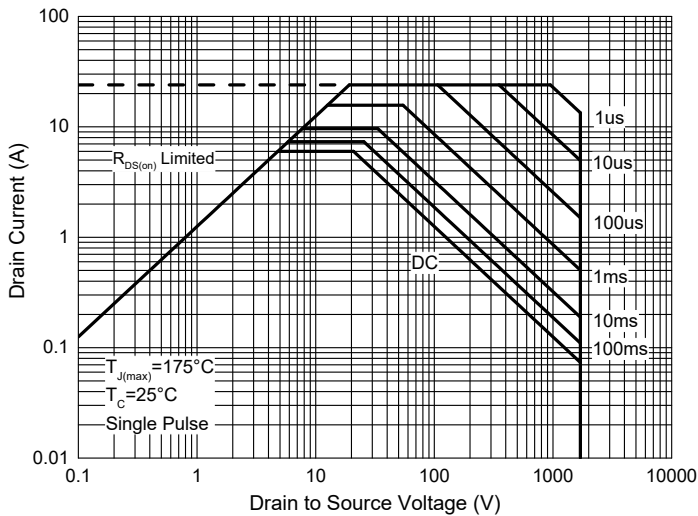
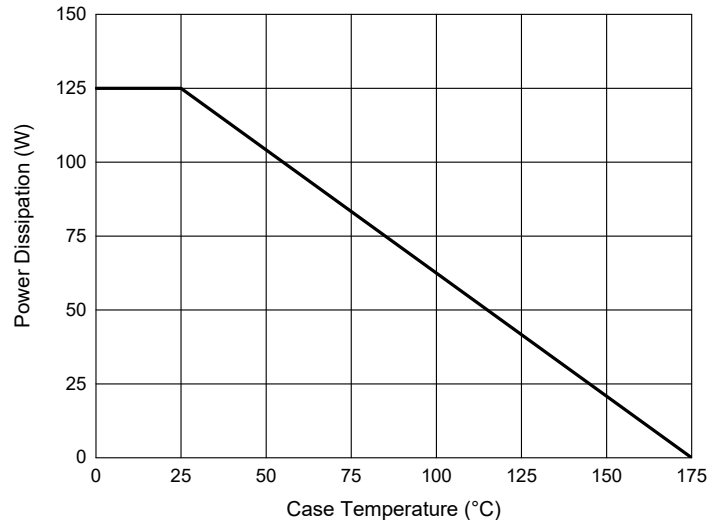


Fig. 18 - Power Derating



Ordering Information

Device	Packing
SICW400N170A-BP	Tube:30pcs/Tube, 1.8K/Ctn

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