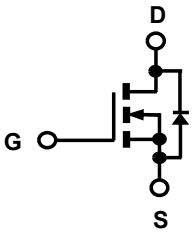
Preliminary
ICE30M120W

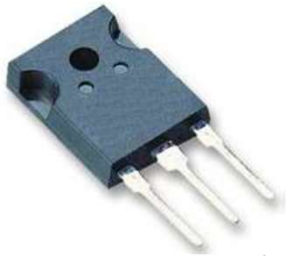
ICE30M120W Silicon Carbide Power MOSFET

Product Summary			
I_D	T_A=25°C	76A	Max
$V_{(BR)DSS}$	T_C=25°C	1200V	Min
$r_{DS(on)}$	V_{GS}=18V	30mΩ	Typ
Q_g	V_{DS}=800V	138nC	Typ

Features

- 1200V 30mohm SiC MOSFET
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast Reverse Recovery
- Optimized design for high performance power systems





TO247
1:G, 2:D, 3:S

(TO-247)

RoHS COMPLIANT
RoHS (EU) 2015/863

CE

HALOGEN FREE

Lead Free

Maximum ratings [a] , at T_j=25°C, unless otherwise specified

Parameter	*Symbol*	*Conditions*	*Value*	*Unit*
Continuous drain current	I_D	T_c=25°C	76	A
		T_c=100°C	54.1	
Pulsed drain current	$I_{D,\ pulse}$		120	A
Maximum gate source voltage	$V_{GS(max)}$		-10/+22	V
Operational gate source voltage	$V_{GS\ op}$		-6/+18	V
Power dissipation	P_{tot}	T_c=25°C	375	W
Storage temperature	T_{stg}		-55 to +175	°C
Operating temperature	T_j			

a Pulse width limited by Tjmax

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Thermal characteristics

Thermal resistance, junction-case	R_{thJC}		-	-	0.4	°C/W
Thermal resistance, junction-ambient	R_{thJA}	leaded	-	-	36	
Soldering temperature, wave soldering only allowed at leads	T_{sold}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

Electrical characteristics [a], at T_j=25°C, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA	1200	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=11.5mA, T_j=25°C	2.2	3.2	4.5	
		V_{DS}=V_{GS}, I_D=11.5mA, T_j=175°C	-	2.2	-	
Zero gate voltage drain current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V	-	5	50	μA
Gate source leakage current	I_{GSS}	V_{GS}=-10/+22V, V_{DS}=0V	-	-	±100	nA
Drain-source on-state resistance	$R_{DS\ (on)}$	V_{GS}=18V, I_D=40A, T_j=25°C	20	30	40	mΩ
		V_{GS}=18V, I_D=40A, T_j=175°C	-	48	-	
Gate resistance	R_G	f=1 MHz, V_{AC}=25mV	-	2.2	-	Ω

Dynamic characteristics

Input capacitance	C_{iss}	V_{DS}=800V, V_{GS}=0V, f=100 kHz, V_{AC}=25mV	-	2940	-	pF
Output capacitance	C_{oss}		-	129	-	
Reverse transfer capacitance	C_{rss}		-	15	-	
C_{OSS} stored energy	E_{oss}		-	80	-	μJ
Forward transconductance	g_{FS}	V_{DS}=20V, I_D=40A	-	27	-	S
Turn-on delay time	$t_{d(on)}$	V_{DS}=800V, V_{GS}=-5/+18V, I_D=40A, R_G=2.5Ω (External), L=99μH, Diode: Body Diode at V_{GS}=-5V	-	14	-	ns
Rise time	t_r		-	31	-	
Turn-off delay time	$t_{d(off)}$		-	32	-	
Fall time	t_f		-	12	-	
Turn-on switching energy	E_{ON}		-	1278	-	μJ
Turn-off switching energy	E_{OFF}		-	154	-	

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	
Dynamic characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DS}=800V, V_{GS}=-5/+18V, I_D=40A, R_G=2.5Ω (External), L=99μH, Diode: Body Diode at V_{GS}=-5V T_j=175°C	-	12	-	ns
Rise time	t_r		-	32	-	
Turn-off delay time	$t_{d(off)}$		-	37	-	
Fall time	t_f		-	13	-	
Turn-on switching energy	E_{ON}		-	1616	-	μJ
Turn-off switching energy	E_{OFF}		-	178	-	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DS}=800V, I_D=40A, V_{GS}=-5 to +18V	-	34	-	nC
Gate to drain charge	Q_{gd}		-	35	-	
Gate charge total	Q_g		-	138	-	
Reverse Diode						
Continuous forward current	I_S	V_{GS}=-4V	-	-	76	A
Diode forward voltage	V_{SD}	V_{GS}=-4V, I_{SD}=20A, T_j=25°C	-	4.9	-	V
		V_{GS}=-4V, I_{SD}=20A, T_j=175°C	-	4.4	-	
Reverse recovery time	t_{rr}	V_{GS}=-4V, V_{RR}=800V, I_{SD}=40A, d_{iF}/d_t=1150 A/μs, T_j=25°C	-	61	-	ns
Reverse recovery charge	Q_{rr}		-	367	-	nC
Peak reverse recovery current	I_{rm}		-	12	-	A
Reverse recovery time	t_{rr}	V_{GS}=-4V, V_{RR}=800V, I_{SD}=40A, d_{iF}/d_t=1150 A/μs, T_j=175°C	-	55	-	ns
Reverse recovery charge	Q_{rr}		-	825	-	nC
Peak reverse recovery current	I_{rm}		-	20	-	A

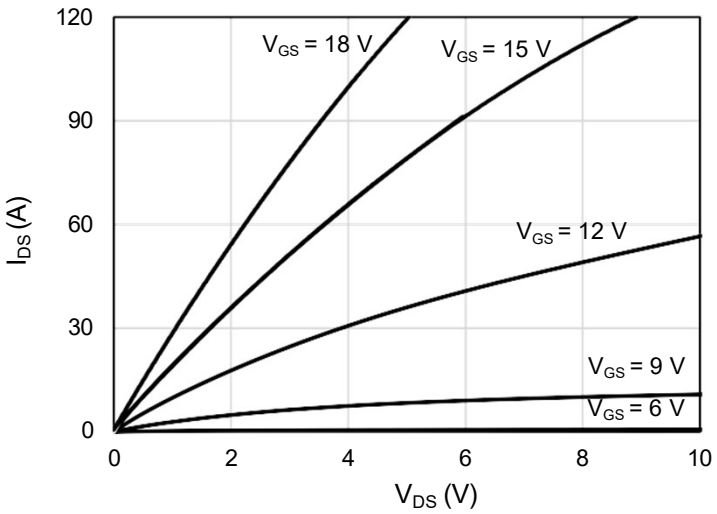


Figure 1: Output Characteristics T_J = -40℃

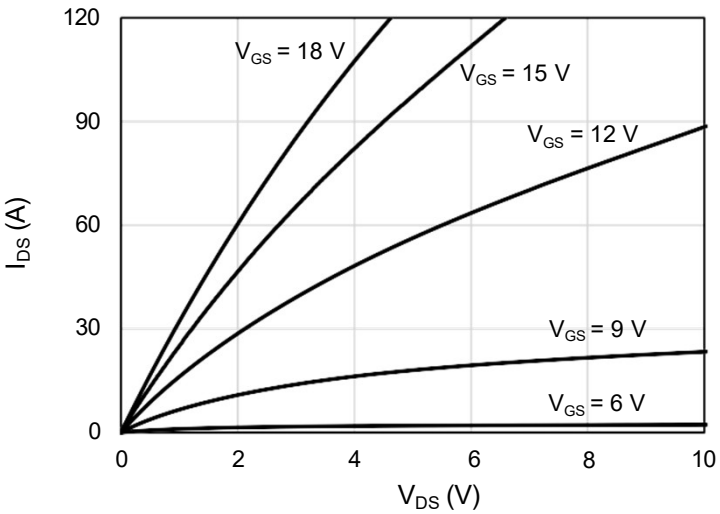


Figure 2: Output Characteristics T_J = 25℃

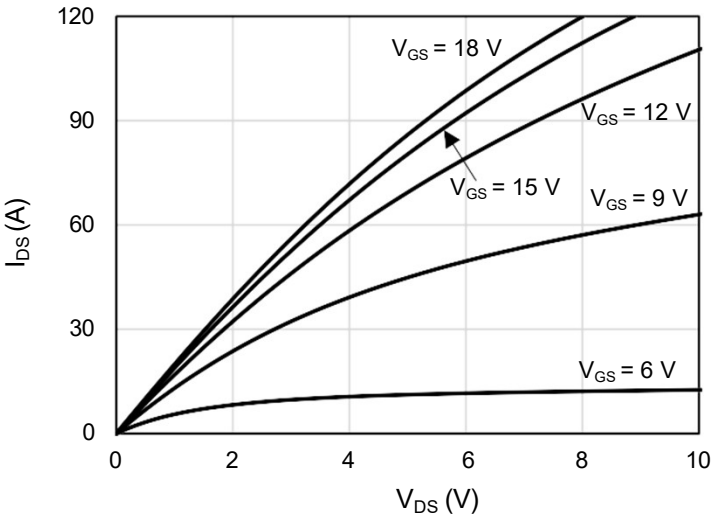


Figure 3: Output Characteristics T_J = 175℃

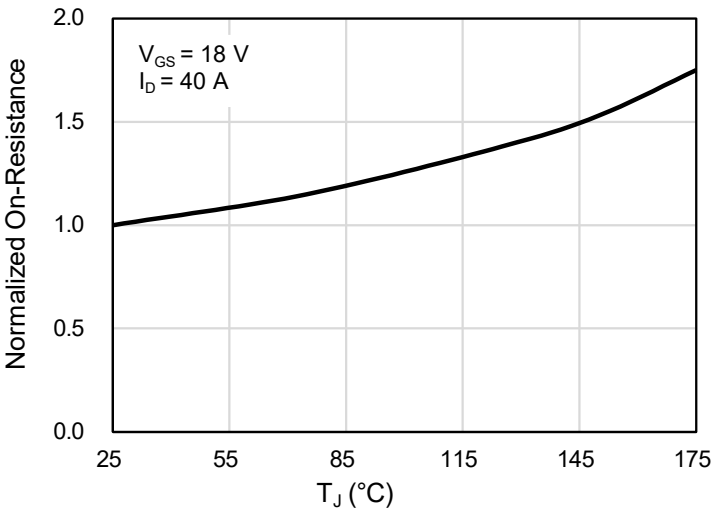


Figure 4: Normalized On-Resistance vs. Temperature

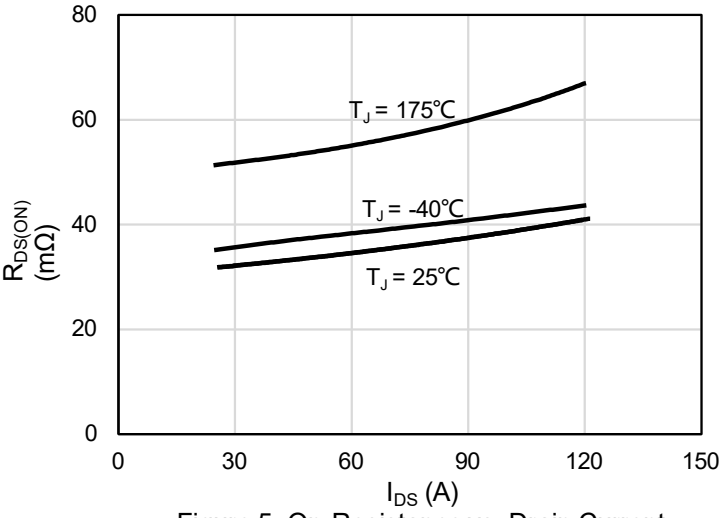


Figure 5: On-Resistance vs. Drain Current For Various Temperatures

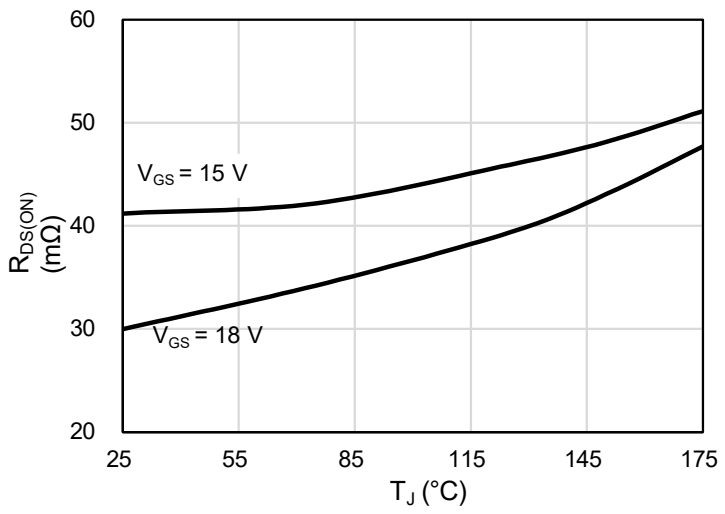


Figure 6: On-Resistance vs. Temperature For Various Gate Voltage

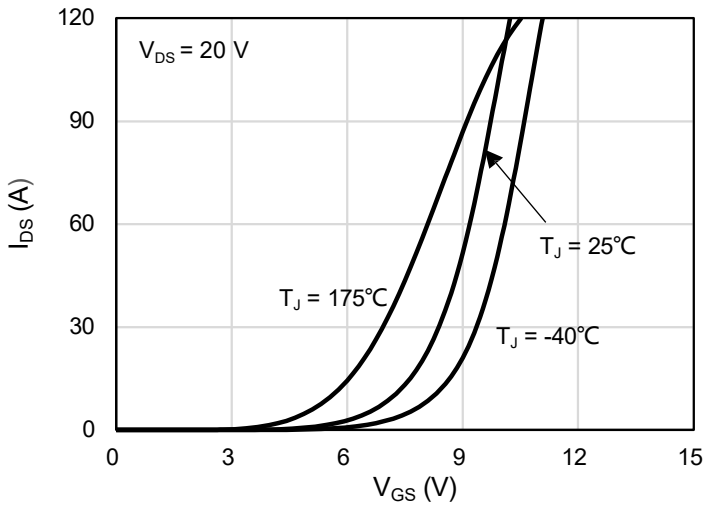


Figure 7: Transfer Characteristics For Various Junction Temparature

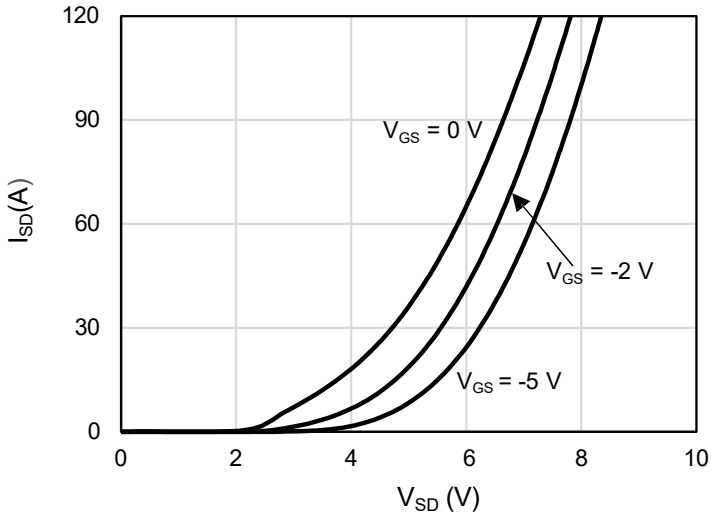


Figure 8: Body Diode Characteristics at -40℃

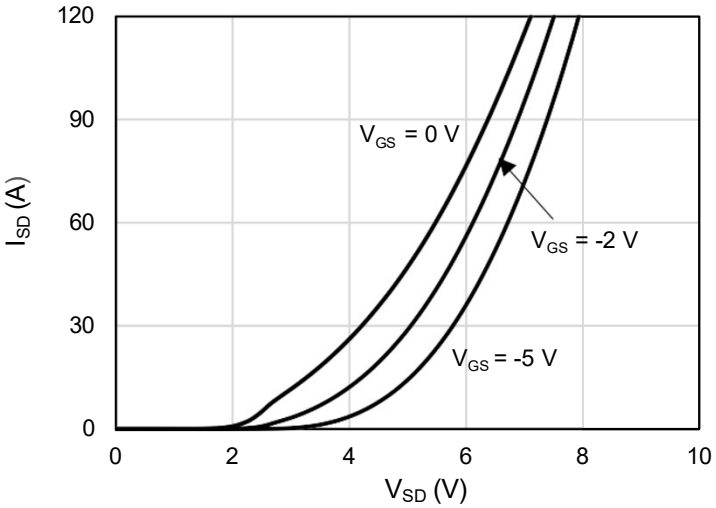


Figure 9: Body Diode Characteristics at 25℃

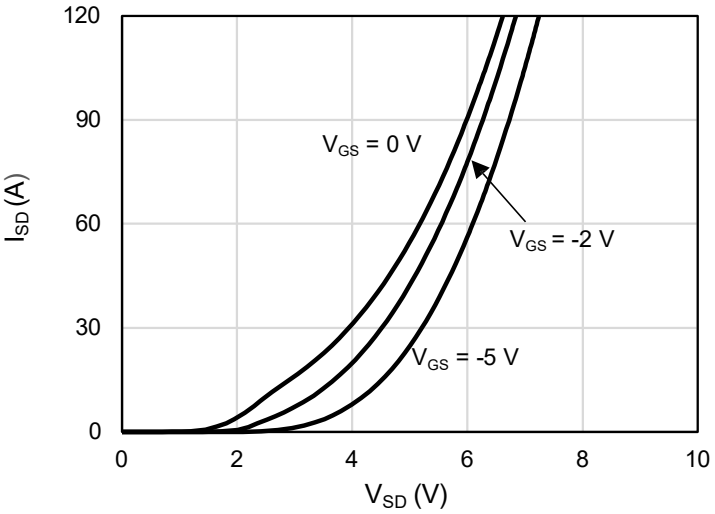


Figure 10: Body Diode Characteristics at 175℃

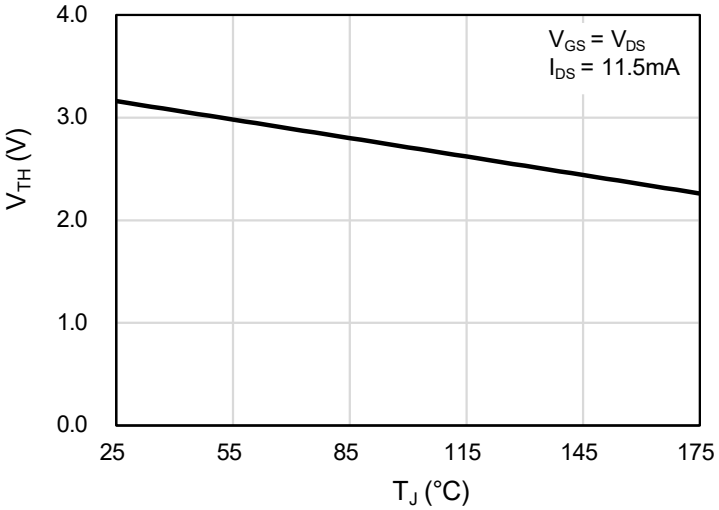


Figure 11: Threshold Voltage vs. Temperature

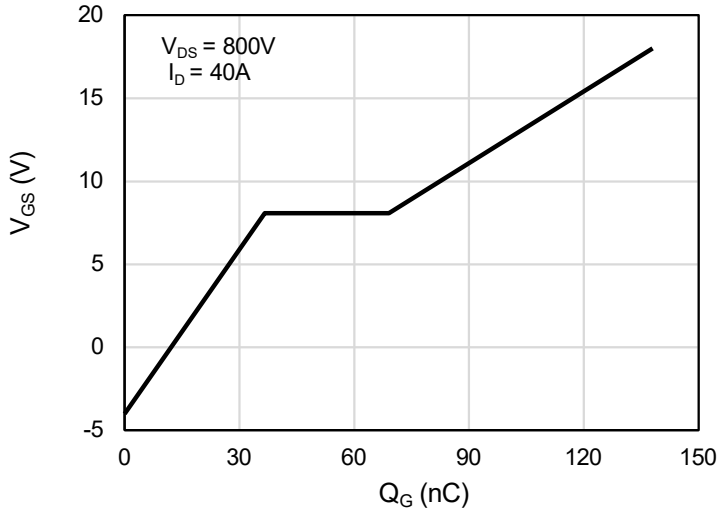


Figure 12: Gate-Charge Characteristics

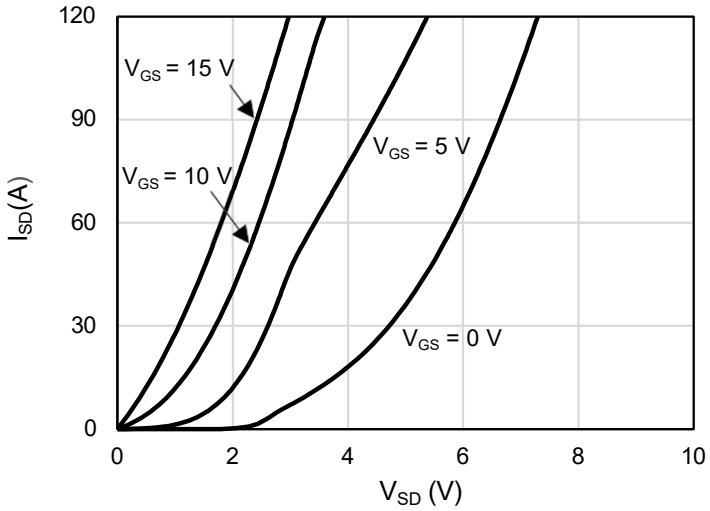


Figure 13: 3rd Quadrant Characteristics at -40℃

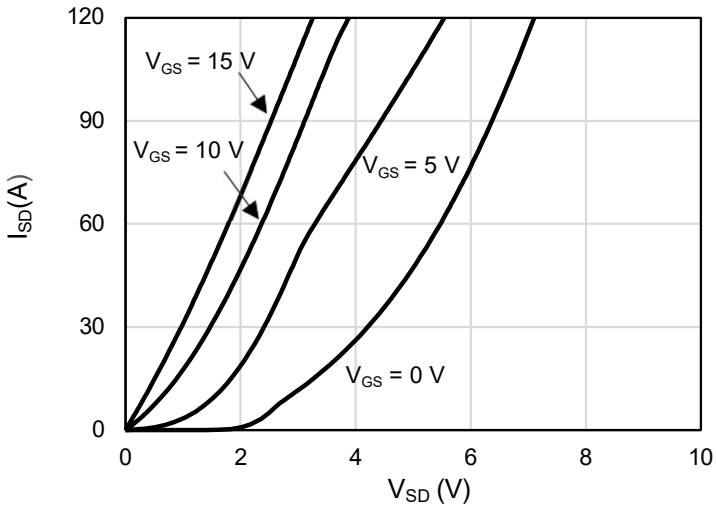


Figure 14: 3rd Quadrant Characteristics at 25℃

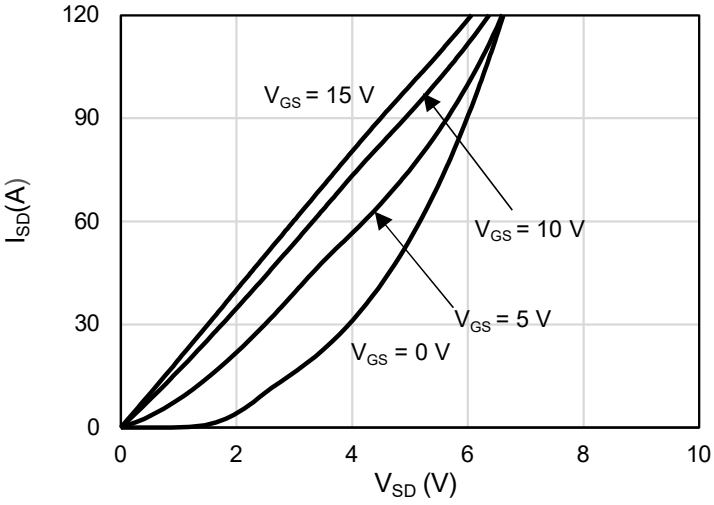


Figure 15: 3rd Quadrant Characteristics at 175℃

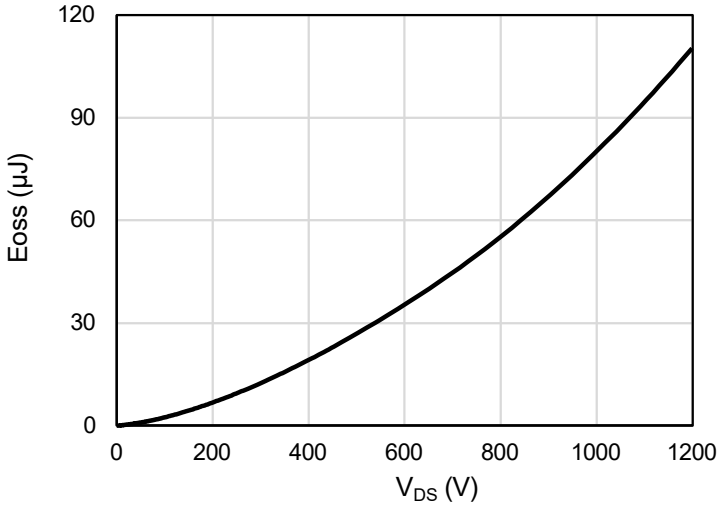


Figure 16: Output Capacitor Stord Energy

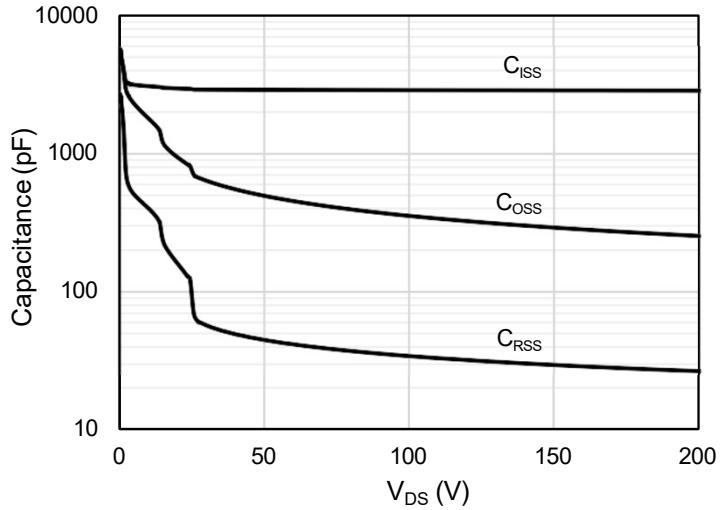


Figure 17: Capacitance Characteristics (0 - 200V)

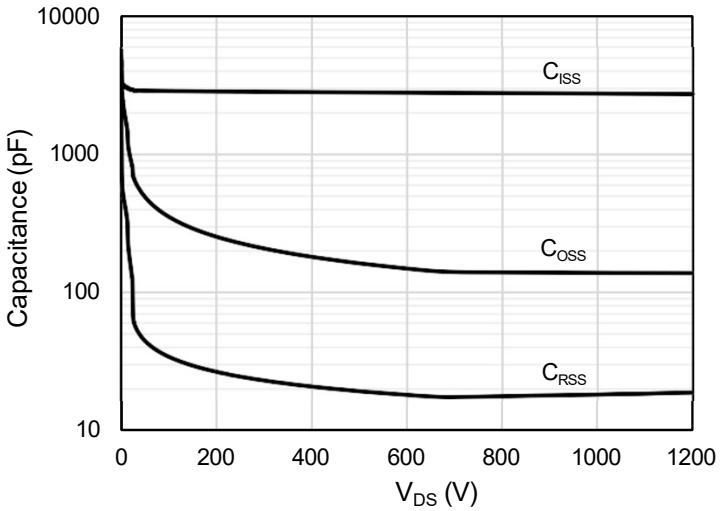


Figure 18: Capacitance Characteristics (0-1200V)

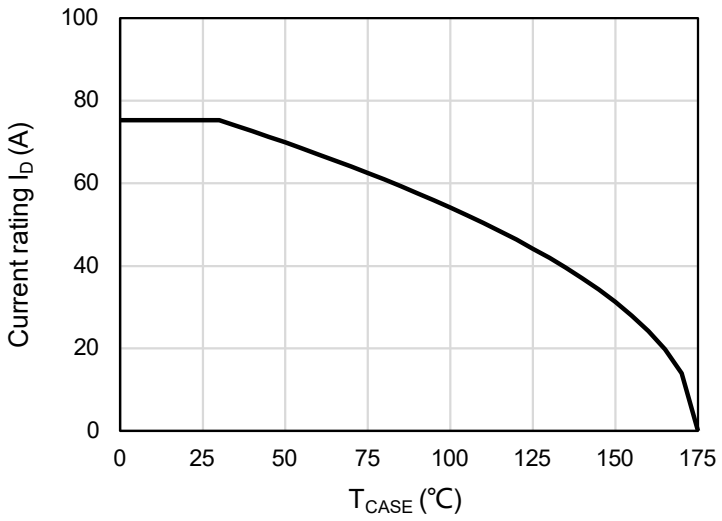


Figure 19: Current De-rating

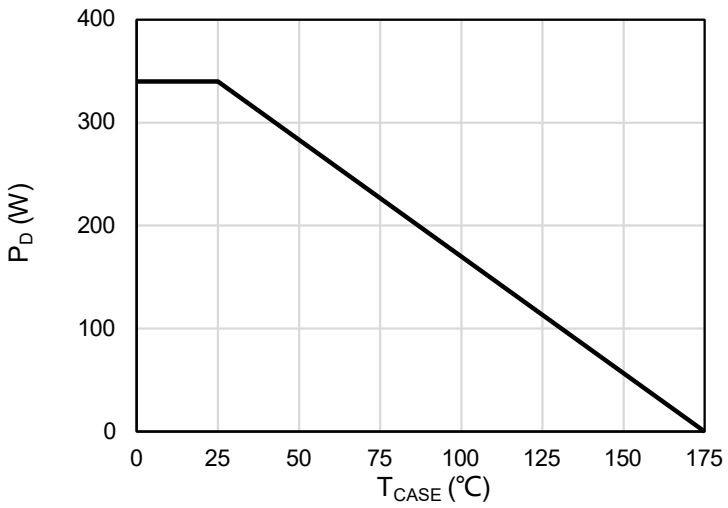


Figure 20: Maximum Power Disspation Derating vs CaseTemperature

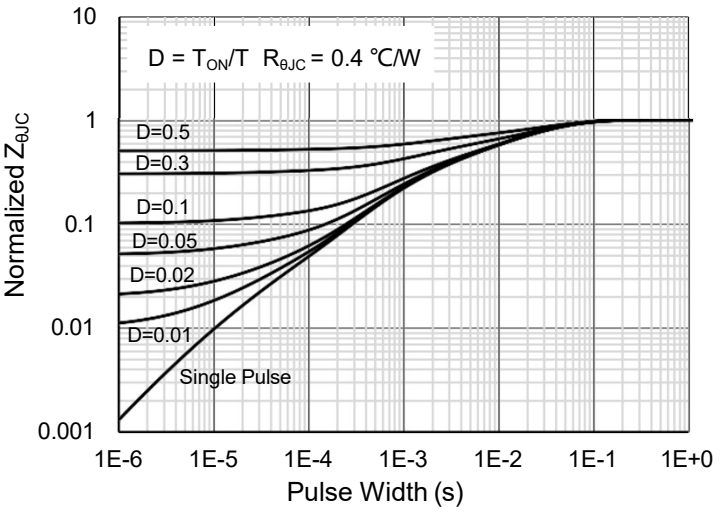


Figure 21: Normalized Maximum Transient Thermal Impedance

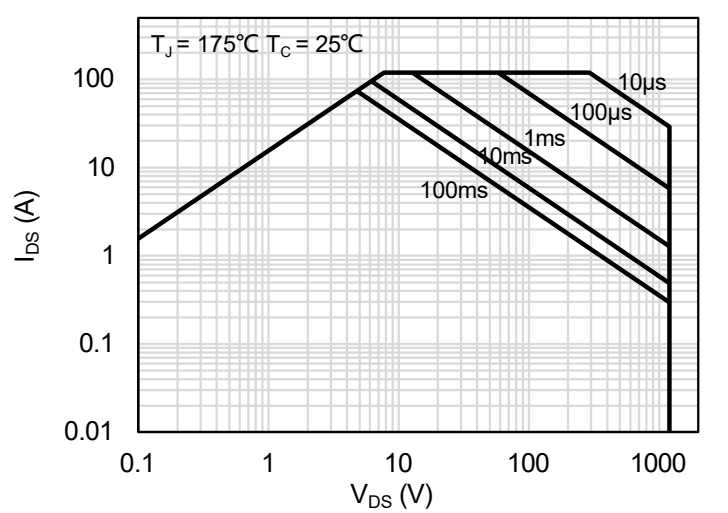


Figure 22: Maximum Forward Biased Safe Operating Area

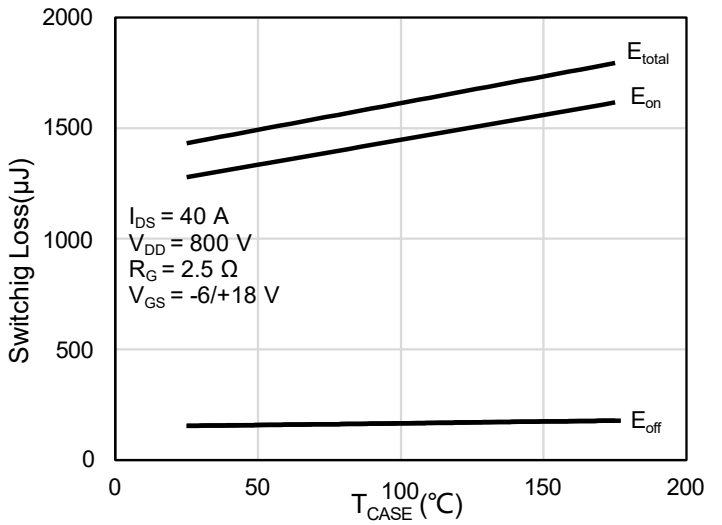
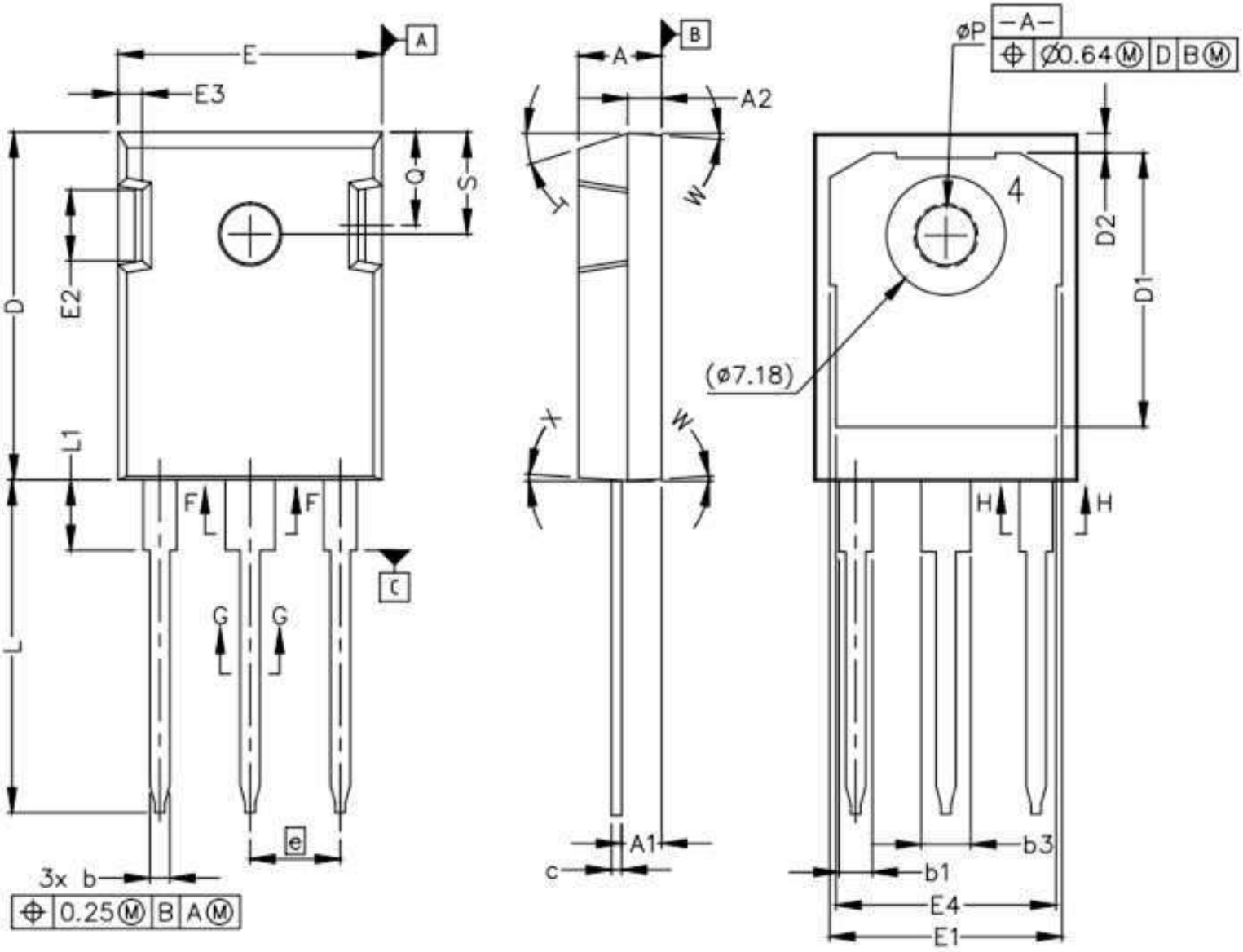


Figure 23: Clamped Inductive Switching Energy vs.Temperature

Package Outline: TO-247



NOTE :
1. ALL METAL SURFACES: TIN PLATED,EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.
4. THIS DRAWING WILL MEET ALL DIMENSIONS REQUIREMENT OF JEDEC outlines TO-247 AD.

1 - GATE
2 - DRAIN (COLLECTOR)
3 - SOURCE (EMITTER)
4 - DRAIN (COLLECTOR)

SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

Package Outline: TO-247

SYMBOL	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	1.91	2.41
b2	1.91	2.16
b3	2.87	3.38
b4	2.87	3.13
c'	0.55	0.65
c	0.55	0.68
D	20.80	21.10
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	5.44 BSC	
N	3	
L	19.81	20.32
L1	4.10	4.40
ØP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	

Marking Information

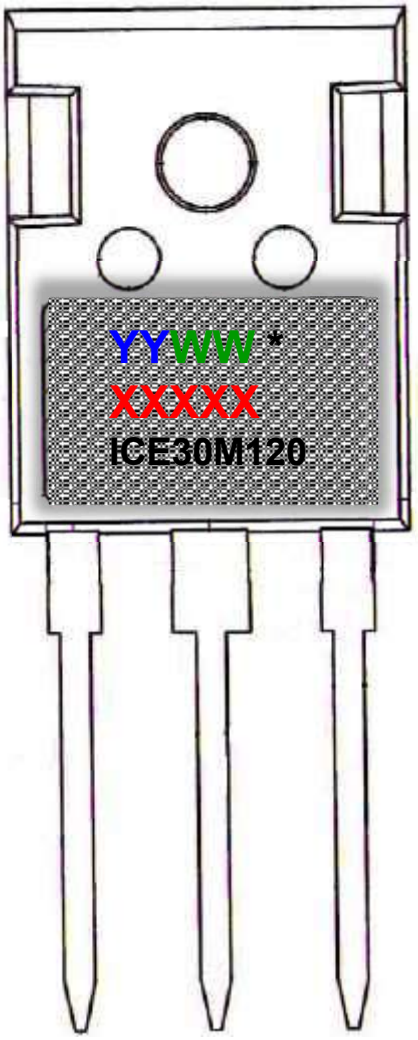
YY = Last two digits of the year

WW = Work week

* = Site ID

XXXXX = Lot ID

ICE30M120 = ICE is IceMOS logo and 30M120 is a designated device part number



Disclaimer

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