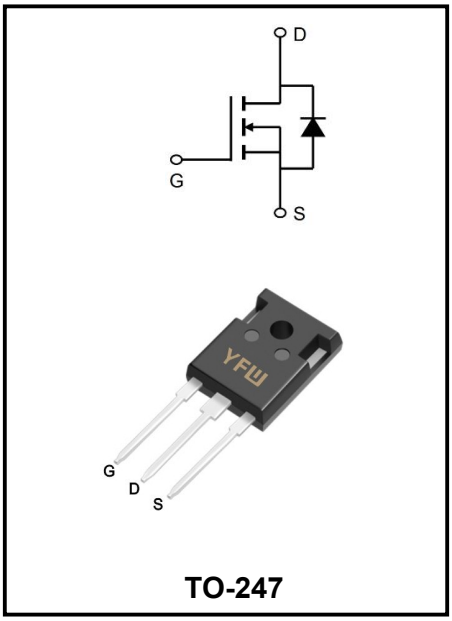
1200V SiC N-Channel MOSFET

MAIN CHARACTERISTICS

I_D	110A
V_{DS}	1200V
R_{DSON}-typ (@V_{GS}=18V T_C=25°C)	＜22mΩ(Typ:16mΩ)



TO-247

FEATURES

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Easy to Parallel
- Simple to Drive
- RoHS Compliant

BENEFITS

- Increased Power Density
- Faster Operating Frequency
- Reduction of Heat Sink Requirements
- Higher Efficiency
- Reduced EMI

APPLICATIONS

- Power Factor Correction Modules
- Switch Mode Power Supplies
- DC-AC Inverters
- High Voltage DC/DC Converters

Maximum Ratings at Tc=25°C unless otherwise specified

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	1200	V
Max Gate-Source Voltage	V_{GS}	-10/+22	V
Recommended Operation Value	V_{GSop}	-4/+18	V
Continue Drain Current T_C=25℃	I_D	111	A
Continue Drain Current T_C=100℃		78	A
Pulsed Drain Current (Note1)	I_{DM}	230	A
Power Dissipation T_C=25℃	P_D	468	W
Power Dissipation T_C=100℃	P_D	202	W
Operating Temperature Range	T_J	-55 to +175	°C
Storage Temperature Range	T_{STG}	-55 to +175	°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.32	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	26.8	°C/W

Note1:Pulse test: 300 μs pulse width, 2 % duty cycle

Electrical Characteristics at Tc=25°C unless otherwise specified

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{GS} = 0 V,I_D = 1mA	BV_{DSS}	1200	-	-	V
Drain-Source Leakage Current	V_{DS} = 1200 V, V_{GS} = 0 V	I_{DSS}	-	1	10	μA
Gate Leakage Current	V_{GS} = 22V, V_{DS} = 0 V	I_{GSS}	-	-	100	nA
Gate Leakage Current	V_{GS} = -10V, V_{DS} = 0 V	I_{GSS}	-	-	-100	nA
Gate-Source Threshold Voltage T_C = 25℃	V_{DS} = V_{GS} , I_D= 20 mA	$V_{GS(th)}$	2.2	3.2	4.2	V
Gate-Source Threshold Voltage T_C = 175℃	V_{DS} = V_{GS} , I_D = 20 mA T_J = 175°C		-	2.3	-	V
Drain-Source On-State Resistance	V_{GS} = 18V, I_D = 60 A	$R_{DS(on)}$	-	16	22	mΩ
	V_{GS} = 18 V, I_D =60 A,T_J = 175℃		-	28	-	
Internal Gate Resistance	f=1MHz	RG(int)	-	1.4	-	Ω
Input Capacitance	V_{GS} = 0 V V_{DS} = 1000 V f = 1MHz	C_{iss}	-	5073	-	pF
Output Capacitance		C_{oss}	-	217	-	
Reverse Transfer Capacitance		C_{rss}	-	18	-	
Total Gate Charge(Note2)	I_D = 60A V_{DD} = 800 V V_{GS} =-5/18V	Q_G		213		nC
Gate to Source Charge(Note2)		Q_{GS}		63		
Gate to Drain Charge(Note2)		Q_{GD}		27		
Turn-on Delay Time(Note2)	V_{DS} = 800 V, I_D = 60A, V_{GS} = -5/18 V, R_G = 5.1Ω,	$t_{d(ON)}$	-	24	-	ns
Rise Time(Note2)		t_r	-	27	-	
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	57	-	
Fall Time(Note2)		t_f	-	17	-	
Turn-On Energy		Eon	-	661	-	μJ
Turn-Off Energy		Eoff	-	590	-	μJ
Maximun Body-Diode Continuous Current	Tc=25°C	I_S	-	111	-	A
Maximun Body-Diode Continuous Current	Tc=100°C		-	62	-	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	220	-	A
Drain-Source Diode Forward Voltage	V_{GS}=-5V, I_{SD}=30A T_J=25°C	V_{SD}	-	3.7	-	V
Drain-Source Diode Forward Voltage	V_{GS}=-5V, I_{SD}=30A T_J=175°C		-	3.4	-	V
Reverse Recovery Time(Note2)	V_{GS}=-5V, I_{SD}=60A, V_R=800V, diF/dt=1000A/μs	trr	-	20	-	ns
Reverse Recovery Charge(Note2)		Qrr	-	149	-	nC
Peak Reverse Recovery Current		Irrm	-	12.5	-	A

Note2:Pulse test: 300 μs pulse width, 2 % duty cycle

RATINGS AND CHARACTERISTIC CURVES

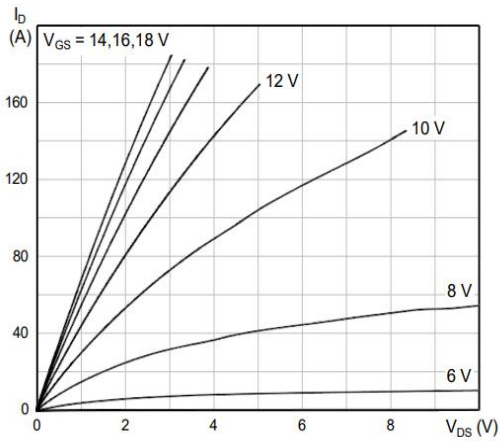


Figure 1 Typical Forward Output Characteristics at T_j=25°C

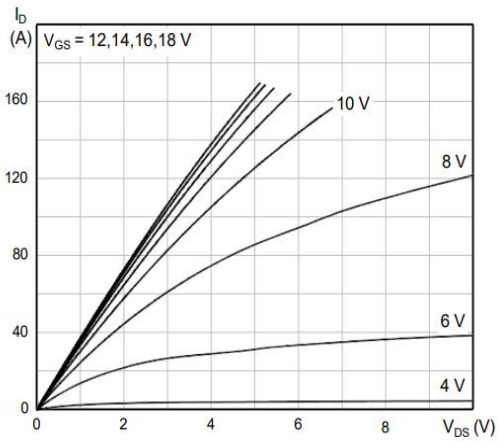


Figure 2 Typical Forward Output Characteristics at T_j=175°C

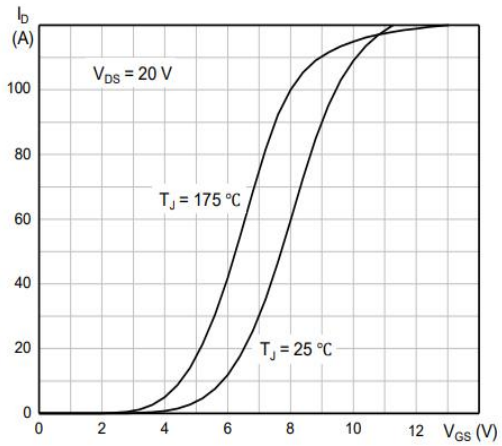


Figure 3 Typical Transfer Characteristic

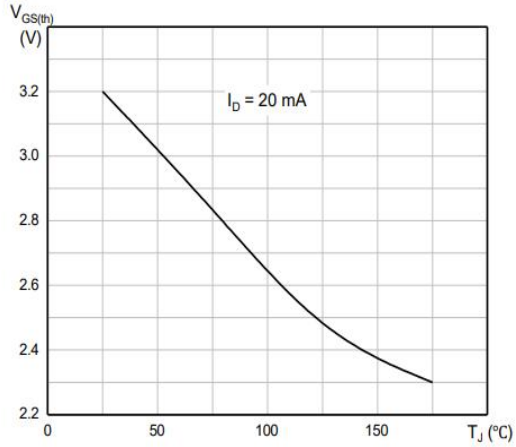


Figure 4 Threshold Voltage vs. Temperature

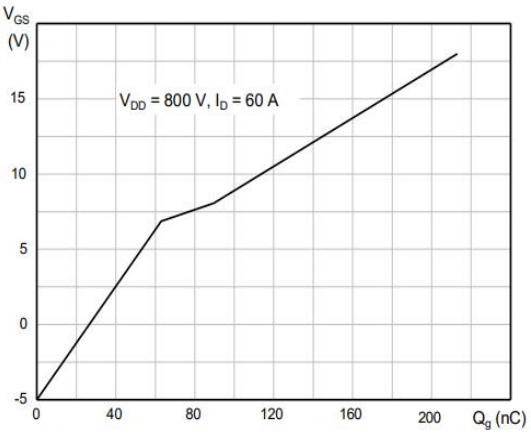


Figure 5 Gate Charge Characteristics

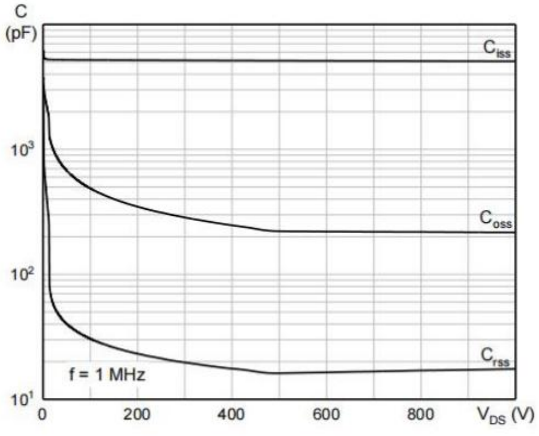


Figure 6 Capacitance vs. Drain-Source Voltage (0 - 1000V)

RATINGS AND CHARACTERISTIC CURVES

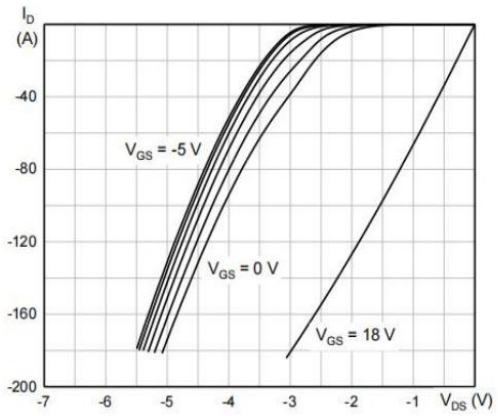


Figure 7 Body Diode Characteristics at T_j=25°C

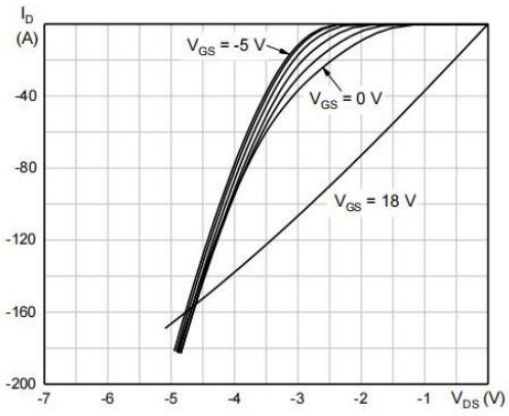


Figure 8 Body Diode Characteristics at T_j=175°C

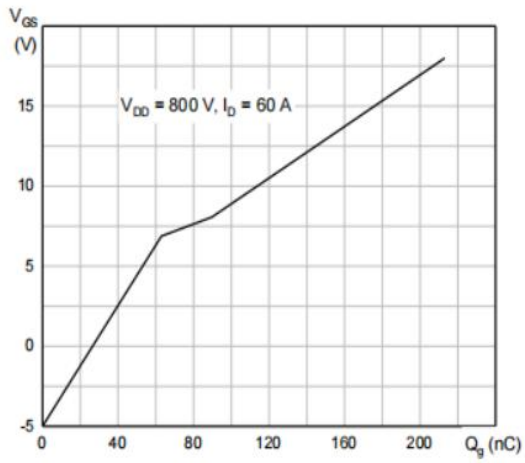


Figure 9 Gate Charge Characteristics

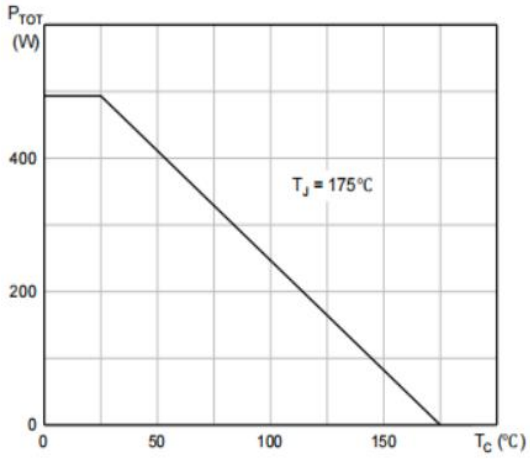


Figure 10 Maximum Power Dissipation Derating vs. Case Temperature

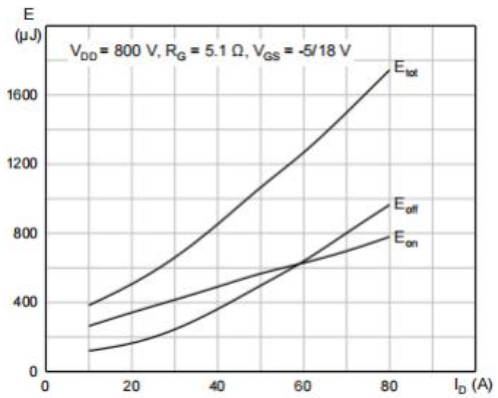


Figure 11 Clamped Inductive Switching Energy vs. Drain Current

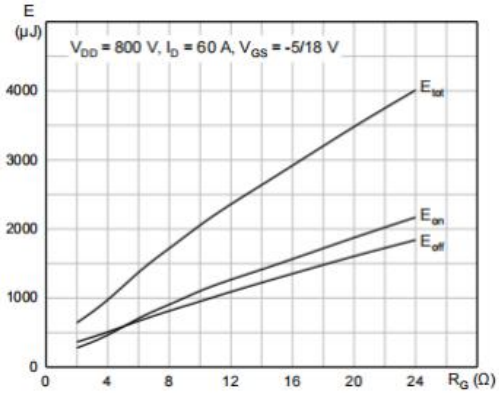


Figure 12 Clamped Inductive Switching Energy vs. External Gate Resistance

RATINGS AND CHARACTERISTIC CURVES

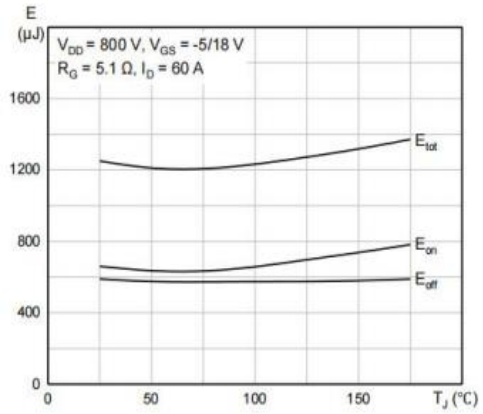


Figure 13 Clamped Inductive Switching Energy vs. Temperature

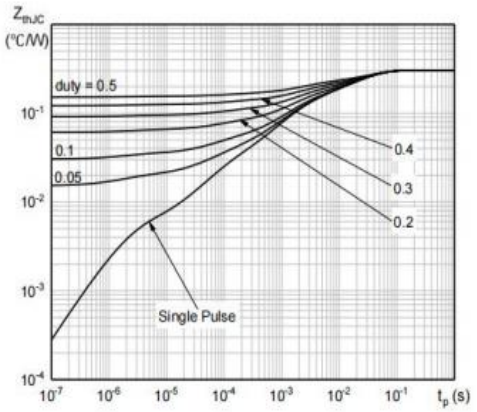


Figure 14 Transient Thermal Impedance (Junction - Case)

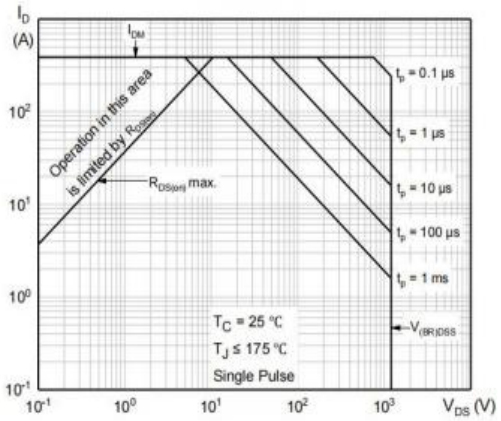


Figure 15 Forward Biased Safe Operating Area

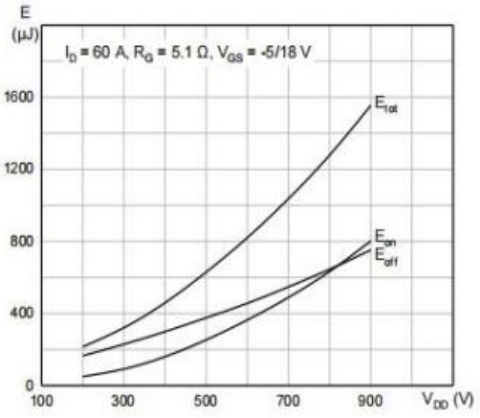


Figure 16 Typical Switching Energy vs. Supply Voltage

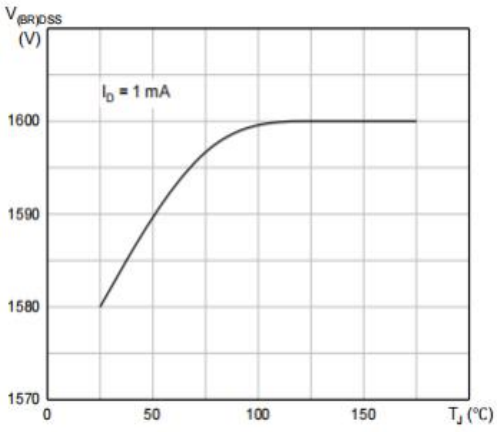
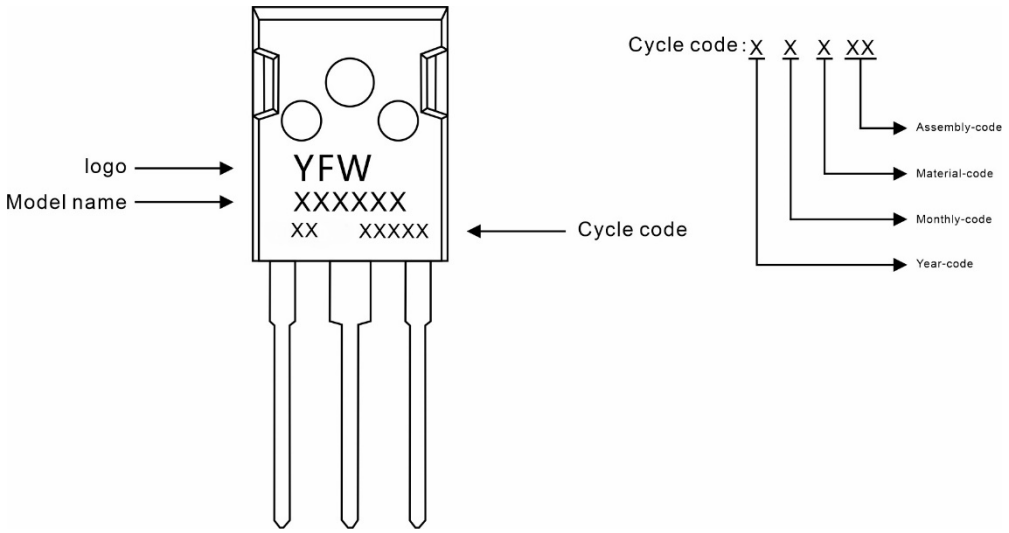


Figure 17 Breakdown Voltage vs. Temperature

Marking Diagram

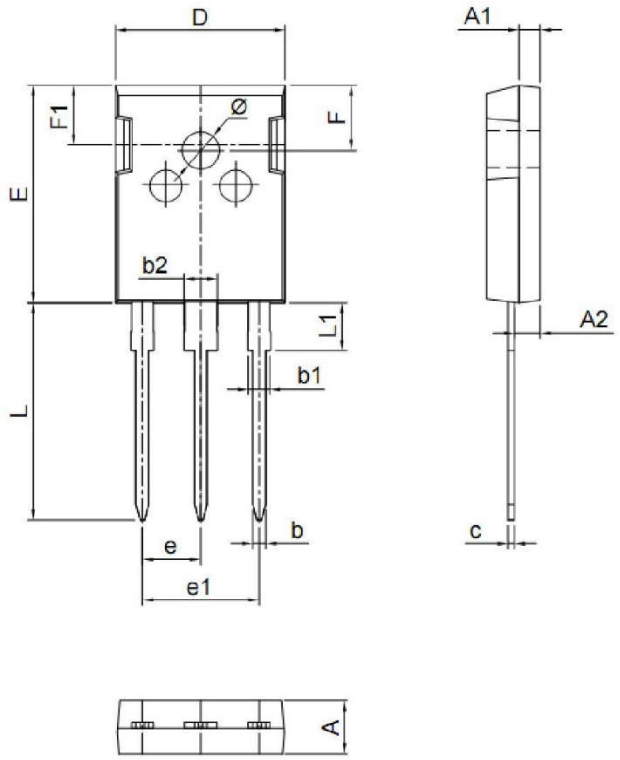


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWM3016120APG3	TO-247	0.209oz(5.93g)	30pcs/tube	600PCS/Box 2400PCS/Carton

Package Dimensions

TO-247



Symbol	Dimensions in mm		Dimensions in Inch	
	Min.	Max.	Min.	Max.
A	4.90	5.10	0.193	0.201
A1	1.90	2.10	0.075	0.083
A2	2.29	2.54	0.090	0.100
b	1.00	1.40	0.039	0.055
b1	2.00	2.20	0.079	0.087
b2	3.00	3.20	0.118	0.126
c	0.50	0.70	0.020	0.028
D	15.75	16.05	0.620	0.632
E	20.20	20.80	0.795	0.819
e	5.45 (BSC)		0.215 (BSC)	
e1	10.90 (BSC)		0.429 (BSC)	
F	6.05	6.25	0.238	0.246
F1	5.80	6.00	0.228	0.236
L	20.10	20.40	0.791	0.803
L1	4.05	4.35	0.159	0.171
Φ	3.50	3.70	0.138	0.146

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