

1200V SiC N-Channel MOSFET

MAIN CHARACTERISTICS

I_D	106A
V_{DS}	1200V
$R_{DS(on)}$ -typ (@ $V_{GS}=18V$ $T_C=25^{\circ}C$)	$<35m\Omega$ (Typ:27m Ω)

FEATURES

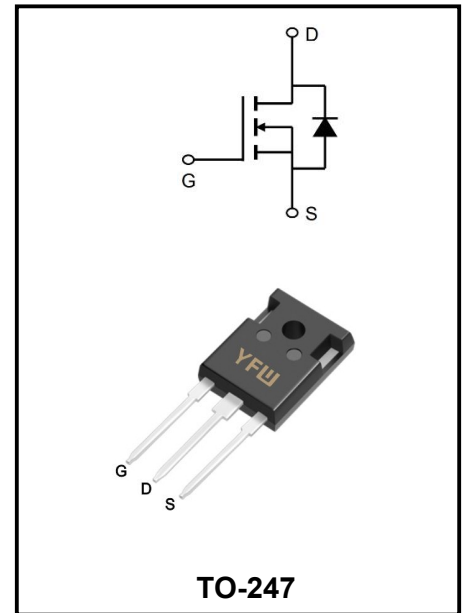
- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Easy to Parallel
- Simple to Drive

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 $T_C=25^{\circ}C$ unless otherwise specified

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	1200	V
Gate-Source Voltage	V_{GS}	-8/+22	V
Recommended Operation Value	V_{GSop}	-4/+18	V
Continue Drain Current $T_C=25^{\circ}C$	I_D	106	A
Continue Drain Current $T_C=100^{\circ}C$		75	
Pulsed Drain Current	I_{DM}	210	A
Power Dissipation $T_C=25^{\circ}C$	P_D	517	W
Power Dissipation $T_C=100^{\circ}C$		258	
Operating Temperature Range	T_J	-40 to +175	$^{\circ}C$
Storage Temperature Range	T_{STG}	-40 to +175	$^{\circ}C$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.29	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	26.8	$^{\circ}C/W$

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	$V_{GS} = 0\text{ V}, I_D = 100\mu\text{A}$	BV_{DSS}	1200	-	-	V
Drain-Source Leakage Current	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	-	1	-	μA
Gate Leakage Current	$V_{GS} = 18\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	-	-	250	nA
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 14\text{ mA}$	$V_{GS(th)}$	2.2	2.8	4	V
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 14\text{ mA}$ $T_J = 175^\circ\text{C}$		-	2.1	-	V
Drain-Source On-State Resistance	$V_{GS} = 18\text{ V}, I_D = 50\text{ A}$	$R_{DS(on)}$	-	27	35	m Ω
	$V_{GS} = 18\text{ V}, I_D = 50\text{ A}, T_J = 175^\circ\text{C}$		-	40	-	
Input Capacitance	$V_{GS} = 0\text{ V}$ $V_{DS} = 1000\text{ V}$ $f = 100\text{ KHz}$	C_{ISS}	-	2990	-	pF
Output Capacitance		C_{OSS}	-	143	-	
Reverse Transfer Capacitance		C_{rss}	-	8.9	-	
Coss Stored Energy		E_{oss}	-	175	-	
Total Gate Charge(Note2)	$I_D = 50\text{ A}$ $V_{DD} = 800\text{ V}$ $V_{GS} = -4/+18\text{ V}$	Q_G	-	134	-	nC
Gate to Source Charge(Note2)		Q_{GS}	-	32	-	
Gate to Drain Charge(Note2)		Q_{GD}	-	44	-	
Turn-on Delay Time(Note2)	$V_{DS} = 800\text{ V},$ $I_D = 60\text{ A},$ $V_{GS} = -5/18\text{ V},$ $R_G = 5.1\Omega,$	$t_{d(ON)}$	-	17	-	ns
Rise Time(Note2)		t_r	-	15	-	
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	28	-	
Fall Time(Note2)		t_f	-	8	-	
Turn-On Energy		E_{on}	-	283	-	μJ
Turn-Off Energy		E_{off}	-	95	-	μJ
Maximun Body-Diode Continuous Current	$V_{GS} = -4\text{ V}, T_c = 25^\circ\text{C}$	I_S	-	105	-	A
Maximun Body-Diode Continuous Current	$V_{GS} = -4\text{ V}, T_c = 100^\circ\text{C}$		-	59	-	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	210	-	A
Drain-Source Diode Forward Voltage	$V_{GS} = -4\text{ V}, I_{SD} = 25\text{ A}$	V_{SD}	-	3.8	-	V
	$V_{GS} = -4\text{ V}, I_{SD} = 25\text{ A}, T_J = 175^\circ\text{C}$		-	3.4	-	V
	$V_{GS} = -4\text{ V}, I_{SD} = 50\text{ A}$		-	4.3	-	V
	$V_{GS} = -4\text{ V}, I_{SD} = 50\text{ A}, T_J = 175^\circ\text{C}$		-	3.9	-	V
Reverse Recovery Time(Note2)	$V_{GS} = -4\text{ V}, I_{SD} = 50\text{ A},$ $V_R = 800\text{ V}, dI_F/dt$ $= 3692\text{ A}/\mu\text{s}$	t_{rr}	-	18	-	ns
Reverse Recovery Charge(Note2)		Q_{rr}	-	373	-	nC
Peak Reverse Recovery Current		I_{rrm}	-	38	-	A

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

RATINGS AND CHARACTERISTIC CURVES

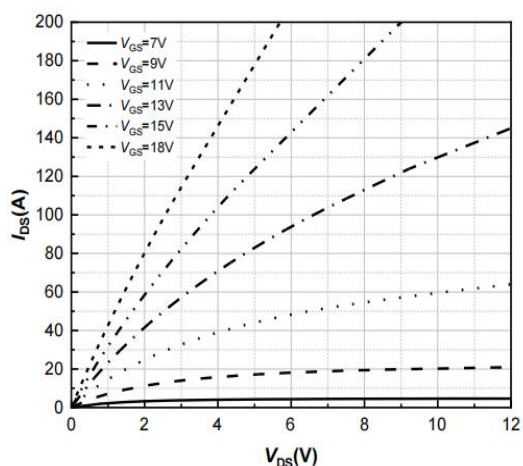


Figure 1. Output Characteristics
 $T_j = -40^{\circ}\text{C}$

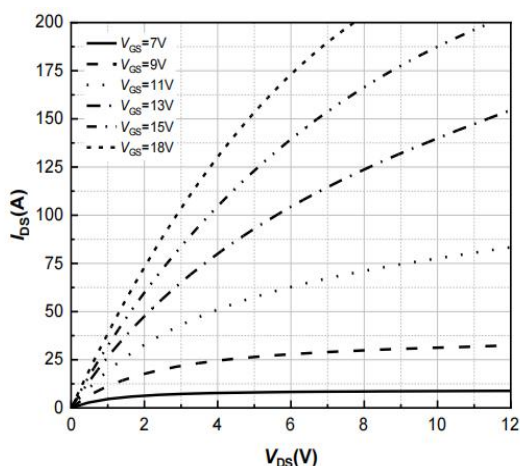


Figure 2. Output Characteristics
 $T_j = 25^{\circ}\text{C}$

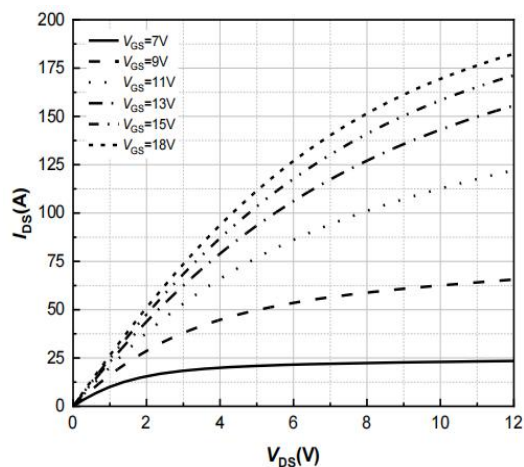


Figure 3. Output Characteristics
 $T_j = 175^{\circ}\text{C}$

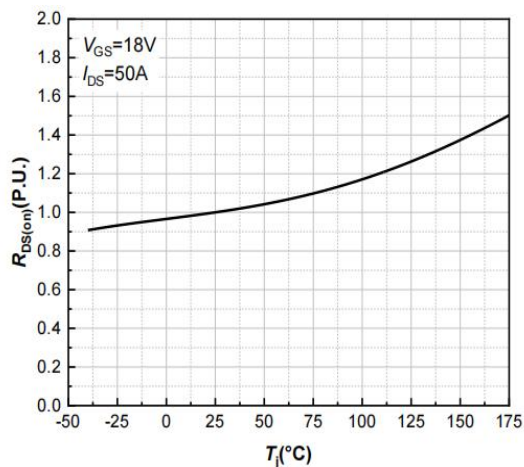


Figure 4. Normalized On-Resistance vs. Temperature

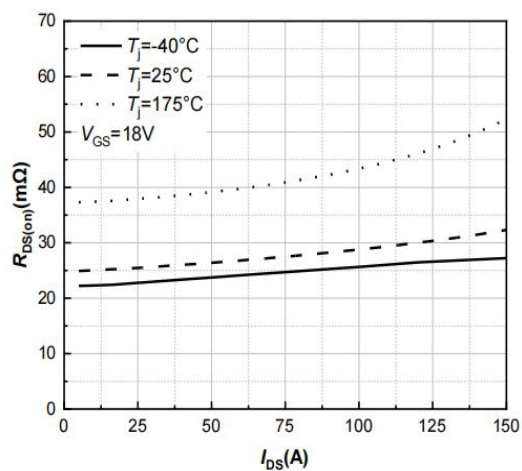


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

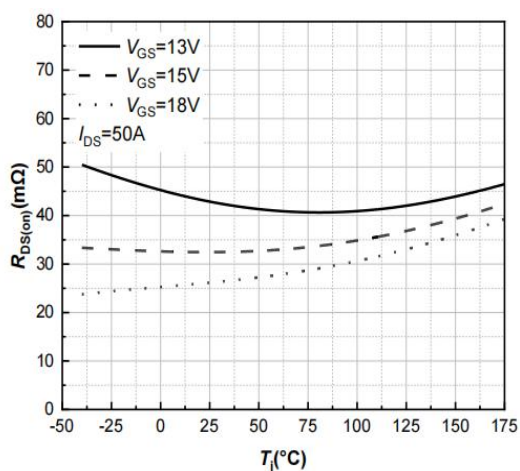


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

RATINGS AND CHARACTERISTIC CURVES

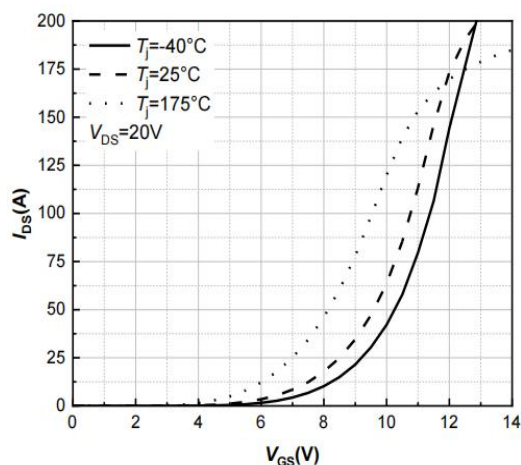


Figure 7. Transfer Characteristic for Various Junction Temperatures
 $V_{DS}=20V$

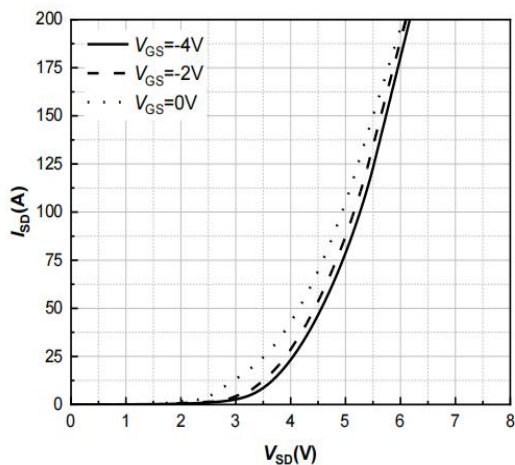


Figure 8. Body Diode Characteristic
 $T_J=-40^{\circ}C$

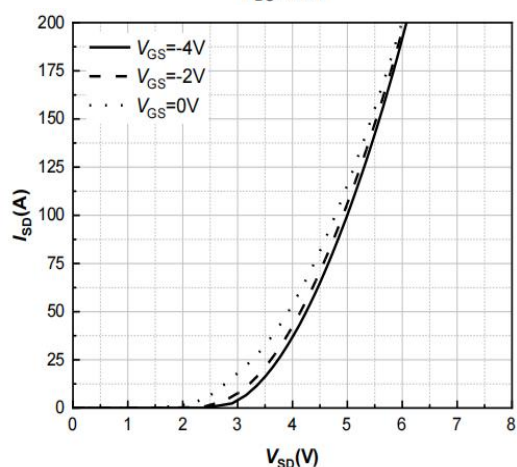


Figure 9. Body Diode Characteristic
 $T_J=25^{\circ}C$

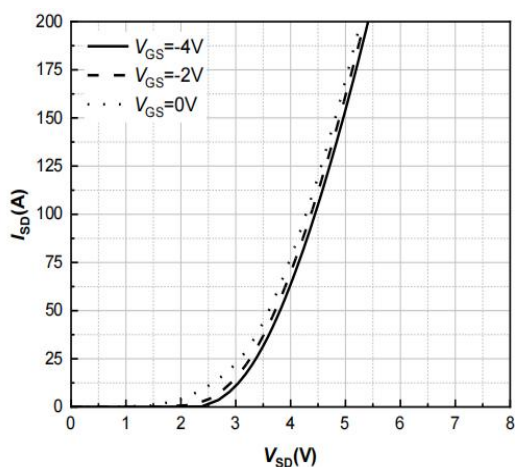


Figure 10. Body Diode Characteristic
 $T_J=175^{\circ}C$

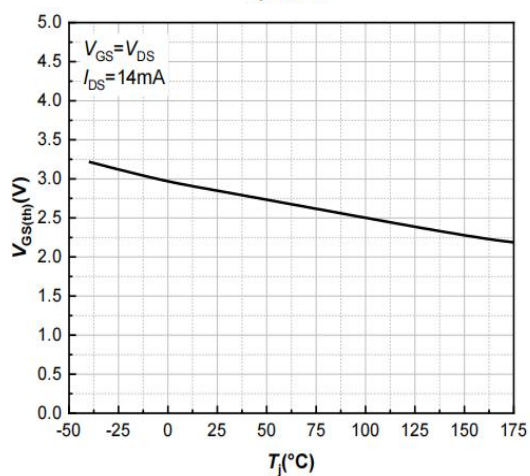


Figure 11. Threshold Voltage vs. Temperature

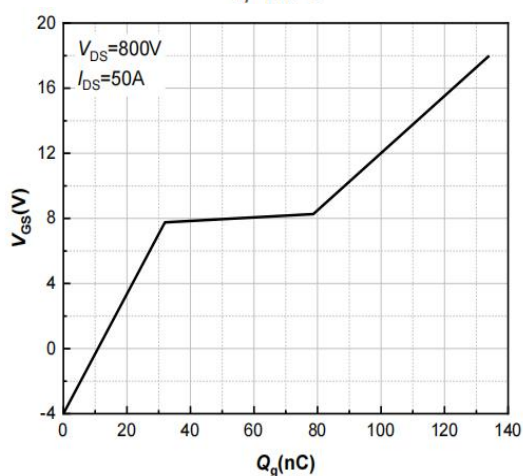


Figure 12. Gate Charge Characteristics

RATINGS AND CHARACTERISTIC CURVES

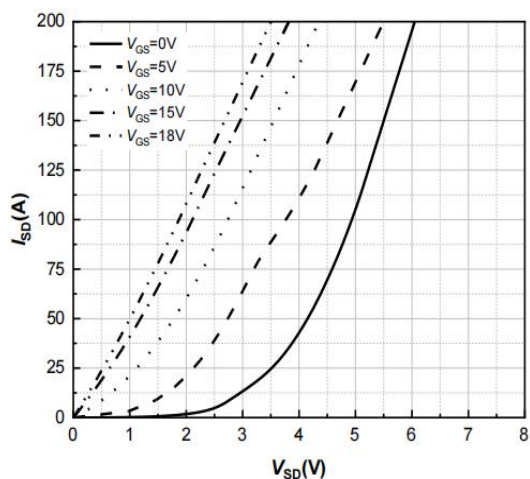


Figure 13. 3rd Quadrant Characteristic
 $T_j = -40^{\circ}\text{C}$

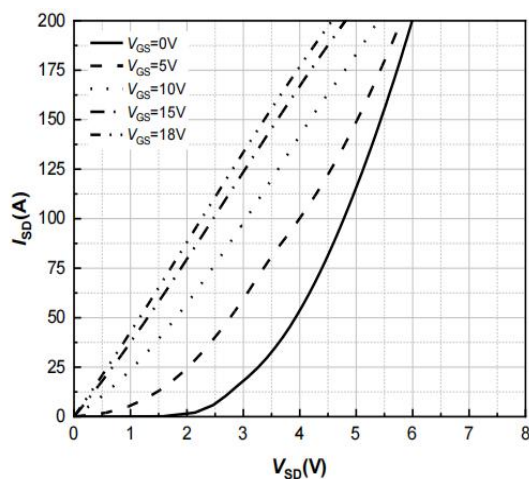


Figure 14. 3rd Quadrant Characteristic
 $T_j = 25^{\circ}\text{C}$

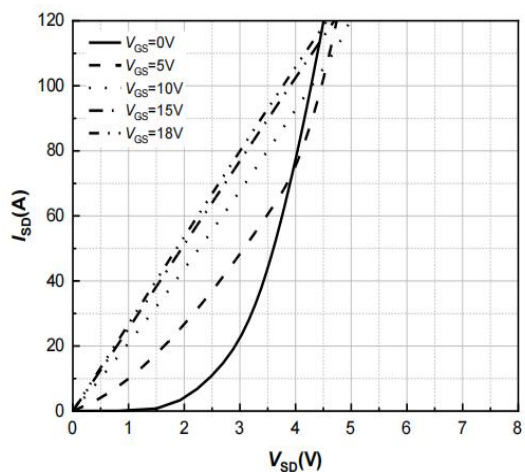


Figure 15. 3rd Quadrant Characteristic
 $T_j = 175^{\circ}\text{C}$

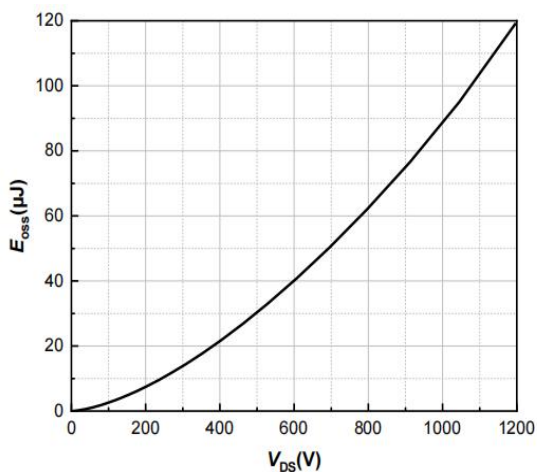


Figure 16. Output Capacitor Stored Energy

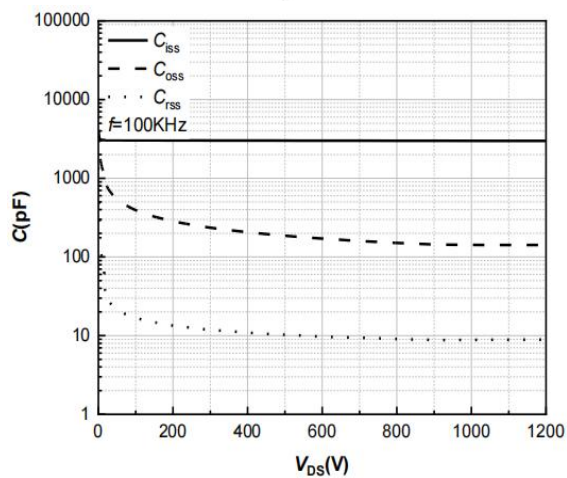
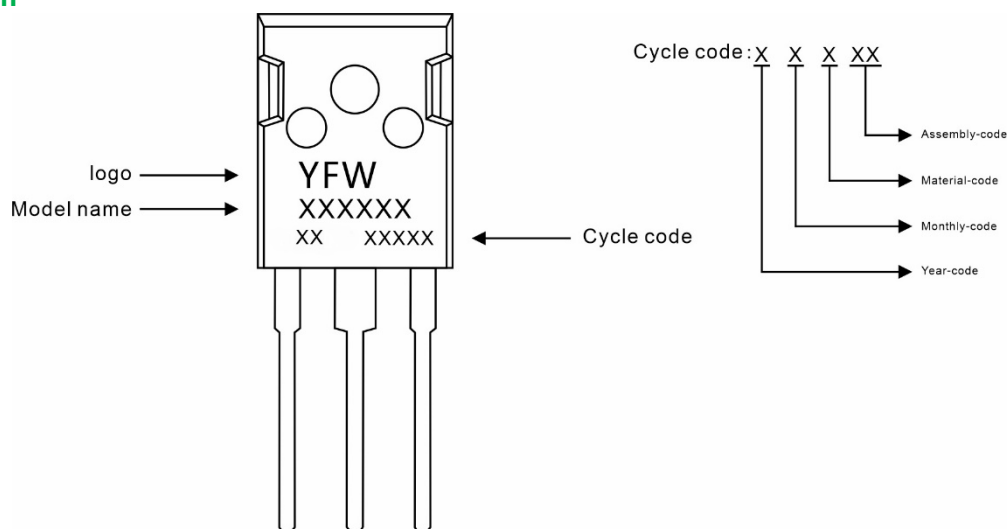


Figure 17. Capacitances vs. Drain-Source

Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWM3027120APG3	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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