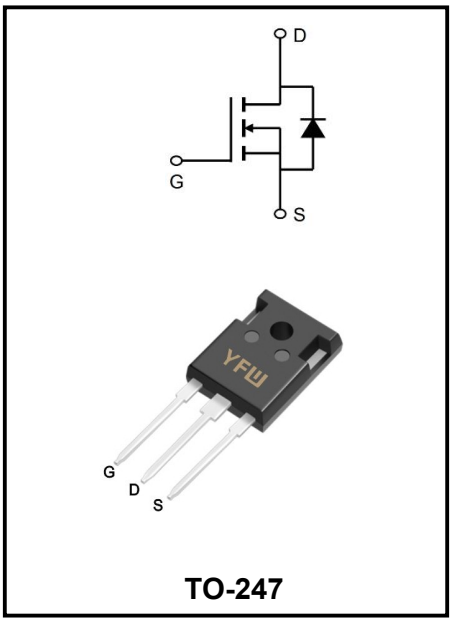
800V SiC N-Channel MOSFET

MAIN CHARACTERISTICS

I_D	72A
V_{DS}	800V
R_{DSON}-typ(@V_{GS}=18V)	＜43mΩ(Typ:33mΩ)



TO-247

FEATURES

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

BENEFITS

- Increased Power Density
- Faster Operating Freequenc
- 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

MECHANICAL DATA

- Case: TO-247/AP
- Mounting Position: Any
- Molded Plastic: UL Flammability Classification Rating 94V-0
- Lead free in compliance with EU RoHS 2011/65/EU directive
- Solder bath temperature 275°C maximum,10s per JESD 22-B106

Maximum Ratings at Tc=25°C unless otherwise specified

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	800	V
Gate-Source Voltage	V_{GS}	-8/+22	V
Recommended Operation Value	V_{GSop}	-4/+18	V
Continue Drain Current Tc=25℃	I_D	72	A
Continue Drain Current Tc=100℃		51	
Pulsed Drain Current	I_{DM}	175	A
Power Dissipation TC=25℃	P_D	208	W
Non-Repetitive Avalanche Switching Energy	E_{AS}	1012	mJ
Short-Circuit Withstand Time	t_{SC}	3	μs
Operating Temperature Range	T_J	-40 to +175	°C
Storage Temperature Range	T_{STG}	-40 to +150	°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.72	°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 = 100μA	BV_{DSS}	800	-	-	V
Drain-Source Leakage Current	V_{DS} = 800 V, V_{GS} = 0 V	I_{DSS}	-	1	-	μA
Gate Leakage Current	V_{GS} = +18 V, V_{DS} = 0 V	I_{GSS}	-	-	250	nA
	V_{GS} = -4 V, V_{DS} = 0 V				-250	nA
Gate-Source Threshold Voltage	V_{DS} = V_{GS} , I_D = 10 mA	$V_{GS(th)}$	2	2.6	4	V
Drain-Source On-State Resistance	V_{GS} = 18 V, I_D = 30 A	$R_{DS(ON)}$	-	33	43	mΩ
	V_{GS} = 18 V, I_D = 30A,T_J = 175℃		-	35	-	mΩ
Forward Transconductance	V_{DS}=20V, I_D=30A	gfs	-	16	-	s
Internal Gate Resistance	f=1MHz	RG	-	1.6	-	Ω
Input Capacitance	V_{DS}=600V V_{GS}=0V f=1MHz	C_{iss}	-	2200	-	pF
Output Capacitance		C_{oss}	-	196	-	pF
Reverse Transfer Capacitance		C_{rss}	-	12	-	pF
Stored Energy in Output Capacitance		E_{OSS}	-	39	-	μJ
Total Gate Charge(Note2)	I_D =30A V_{DD}=400V V_{GS} =-4/+ 18 V	Q_g	-	105	-	nC
Gate to Source Charge(Note2)		Q_{gs}	-	28	-	nC
Gate to Drain Charge(Note2)		Q_{gd}	-	30	-	nC
Turn-on Delay Time(Note2)	V_{DS} = 400 V, I_D=30 A, V_{GS} = -4/+18 V, R_G = 2.5 Ω L=200μH Tj=25°C	$t_{d(on)}$	-	13	-	ns
Rise Time(Note2)		t_r	-	16	-	ns
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	23	-	ns
Fall Time(Note2)		t_r	-	7	-	ns
Turn-on Switching Energy		E_{on}	-	82	-	μJ
Turn-off Switching Energy		E_{off}	-	25	-	μJ
Turn-on Delay Time(Note2)	V_{DS} = 400 V, I_D=30 A, V_{GS} = -4/+18 V, R_G = 2.5 Ω L=200μH Tj=175°C	$t_{d(on)}$	-	12	-	ns
Rise Time(Note2)		t_r	-	15	-	ns
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	26	-	ns
Fall Time(Note2)		t_r	-	6	-	ns
Turn-on Switching Energy		E_{on}	-	60	-	μJ
Turn-off Switching Energy		E_{off}	-	14	-	μJ
Maximun Body-Diode Continuous Current	V_{GS} = -4 V, Tc=25°C	I_S	-	37	-	A
	V_{GS} = -4 V, Tc=100°C		-	20	-	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	-	175	A
Drain-Source Diode Forward Voltage	V_{GS}=-4V,I_{SD}=15A Tj=175°C	V_{SD}	-	4.7	-	V
	V_{GS}=-4V,I_{SD}=15A Tj=175°C		-	4.2	-	V
	V_{GS}=-4V,I_{SD}=30A Tj=25°C		-	5.4	-	V
	V_{GS}=-4V,I_{SD}=30A Tj=175°C		-	48	-	V
Reverse Recovery Time(Note2)	V_{GS} = -4 V， I_{SD} = 30 A,V_R =400V di/dt=1797A/μs, Tj=25°C	trr	-	19	-	ns
Reverse Recovery Charge(Note2)		Qrr	-	233	-	nC
Peak Reverse Recovery Current		Irrm	-	22	-	A
Reverse Recovery Time(Note2)	V_{GS} = -4 V， I_{SD} = 30 A,V_R =400V di/dt=1797A/μs, Tj=175°C	trr	-	22	-	ns
Reverse Recovery Charge(Note2)		Qrr	-	334	-	nC
Peak Reverse Recovery Current		Irrm	-	26	-	A

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

RATINGS AND CHARACTERISTIC CURVES

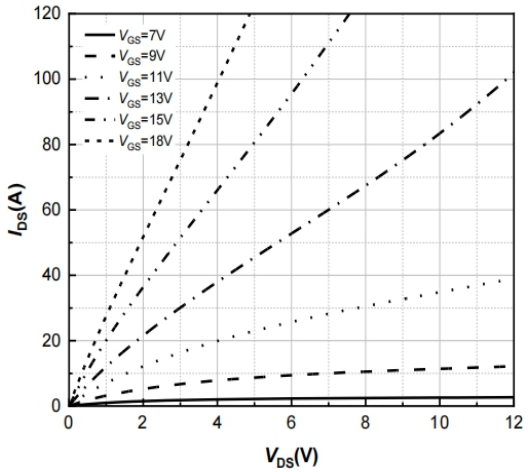


Figure 1. **Output Characteristics T_j=-40°C**

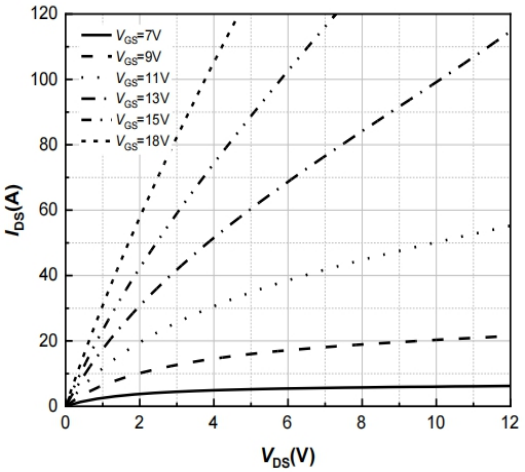


Figure 2. **Output Characteristics T_j=25°C**

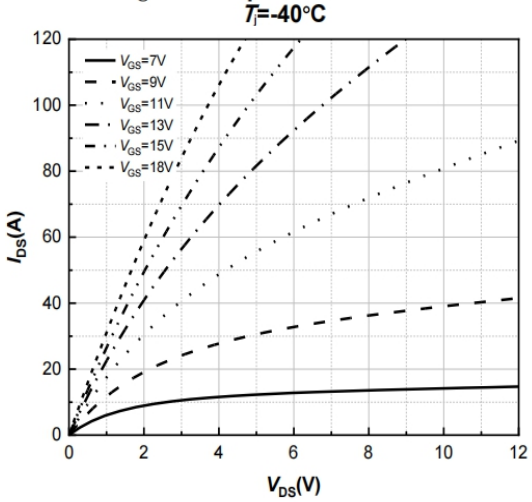


Figure 3. **Output Characteristics T_j=175°C**

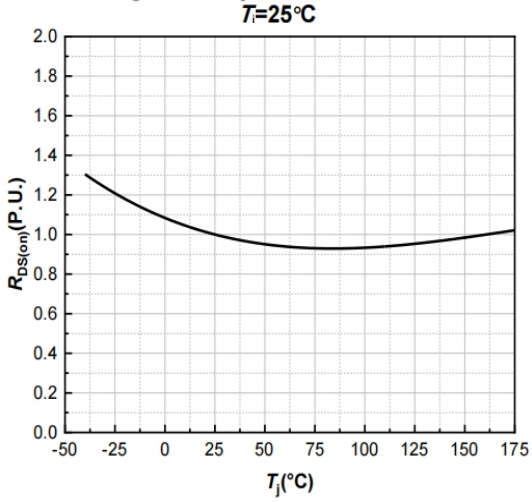


Figure 4. **Normalized On-Resistance vs. Temperature**

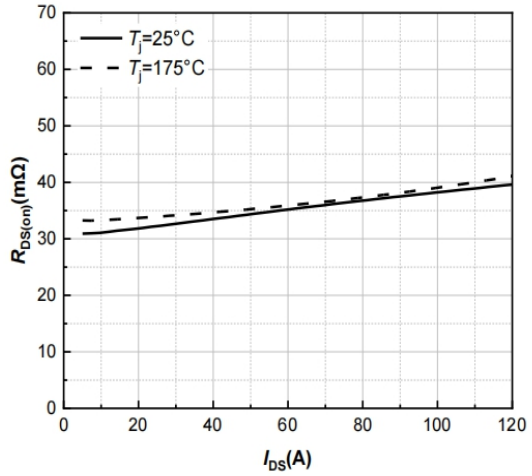


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

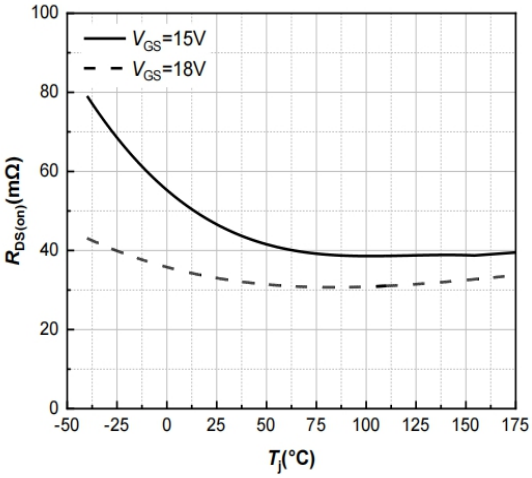


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

RATINGS AND CHARACTERISTIC CURVES

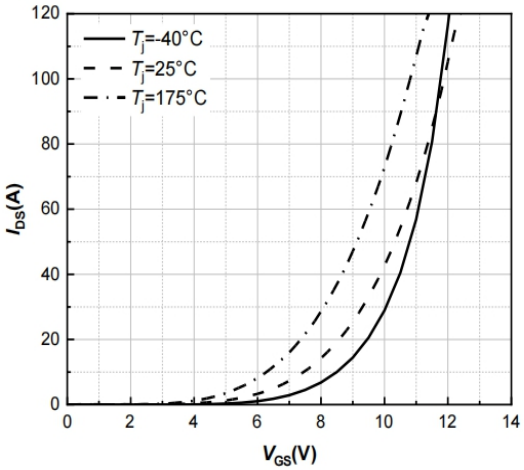


Figure 7. **Transfer Characteristic for Various Junction Temperatures**
V_{DS}=20V

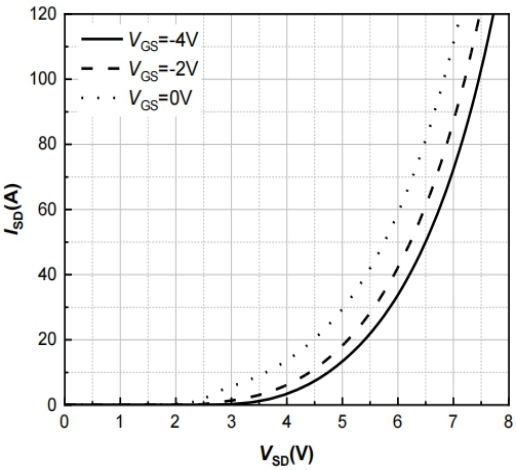


Figure 8. **Body Diode Characteristic**
T_j=-40°C

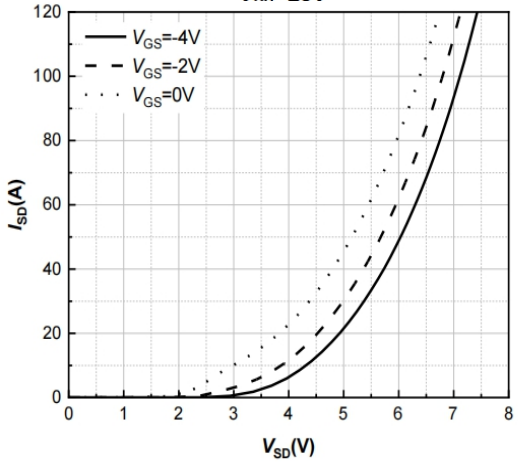


Figure 9. **Body Diode Characteristic**
T_j=25°C

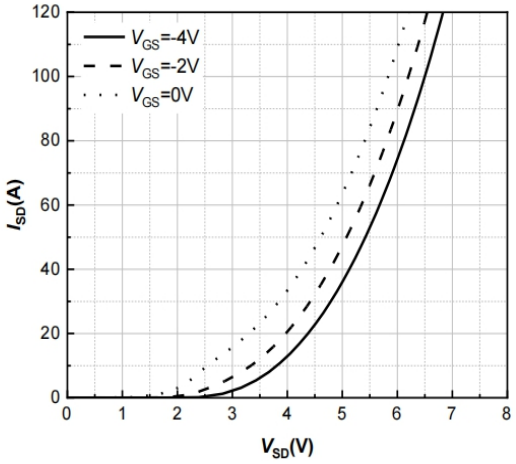


Figure 10. **Body Diode Characteristic**
T_j=175°C

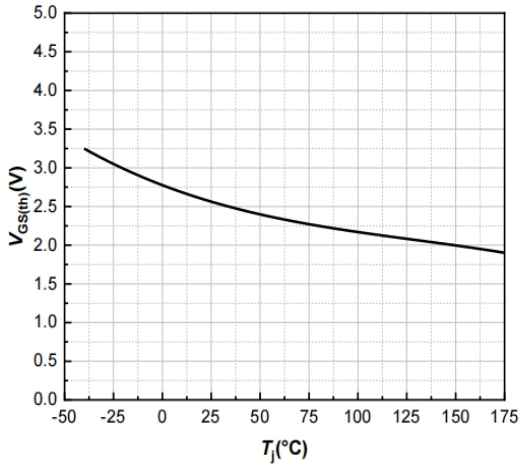


Figure 11. **Threshold Voltage vs. Temperature**

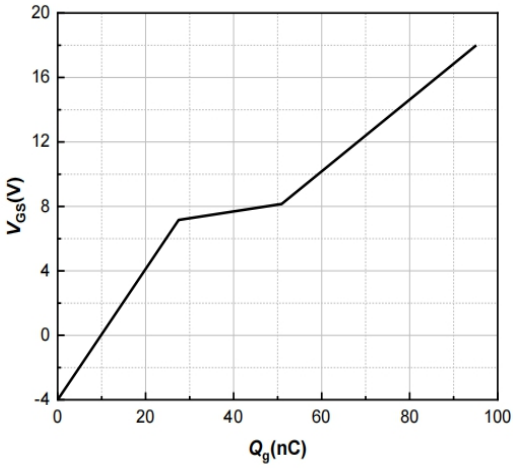


Figure 12. **Gate Charge Characteristics**

RATINGS AND CHARACTERISTIC CURVES

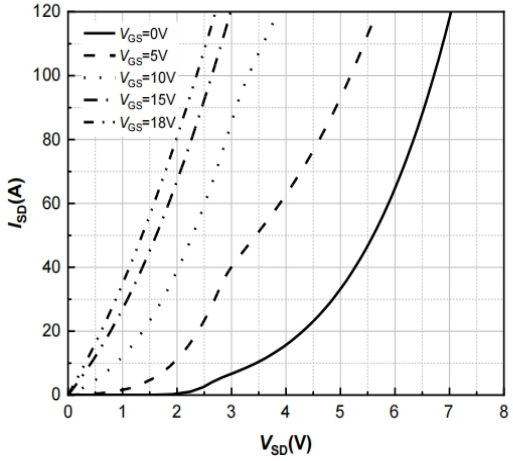


Figure 13. **3rd Quadrant Characteristic T_j=-40°C**

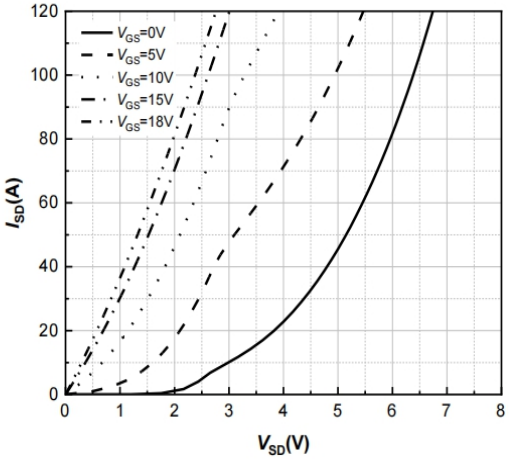


Figure 14. **3rd Quadrant Characteristic T_j=25°C**

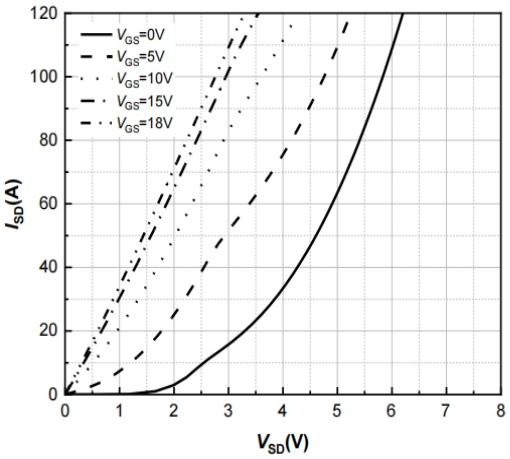


Figure 15. **3rd Quadrant Characteristic T_j=175°C**

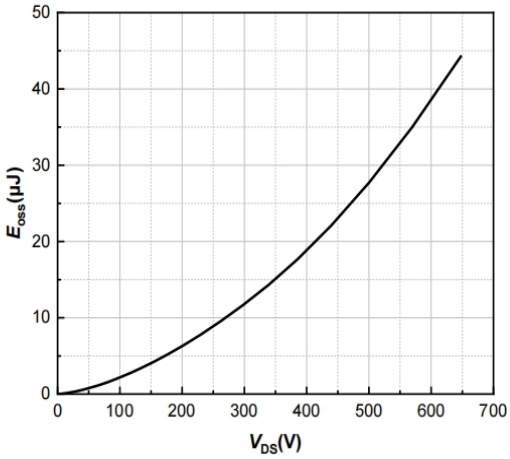


Figure 16. **Output Capacitor Stored Energy**

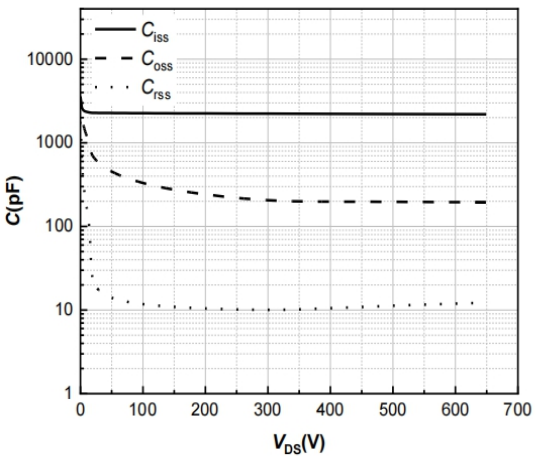
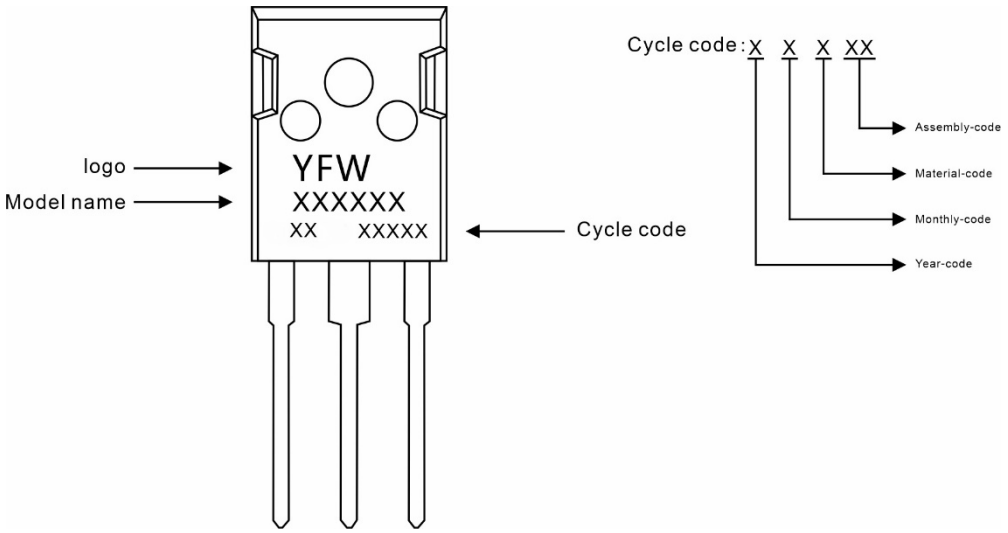


Figure 17. **Capacitances vs. Drain-Source**

Marking Diagram

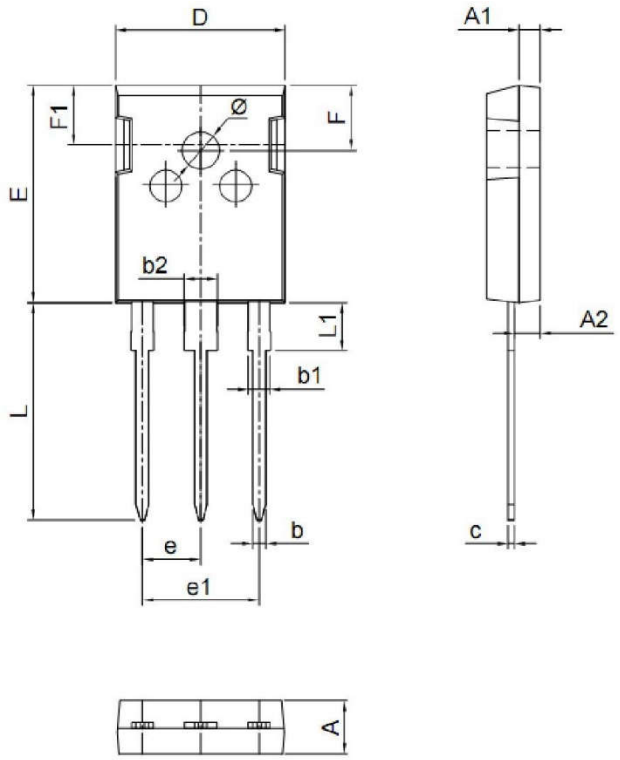


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWM303380APG3	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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