

**800V SiC N-Channel MOSFET**

**MAIN CHARACTERISTICS**

<b>I<sub>D</sub></b>	72A
<b>V<sub>DS</sub></b>	800V
<b>R<sub>DS(on)-typ(@V<sub>GS</sub>=18V)</sub></b>	<43mΩ(Typ:33mΩ)

**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

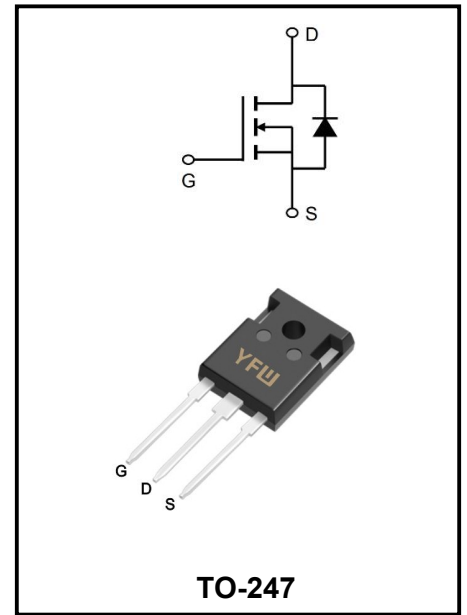
**MECHANICAL DATA**

- ◆ 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	<b>V<sub>DS</sub></b>	800	<b>V</b>
Gate-Source Voltage	<b>V<sub>GS</sub></b>	-8/+22	<b>V</b>
Recommended Operation Value	<b>V<sub>GSop</sub></b>	-4/+18	<b>V</b>
Continue Drain Current T <sub>c</sub> =25°C	<b>I<sub>D</sub></b>	72	<b>A</b>
Continue Drain Current T <sub>c</sub> =100°C		51	
Pulsed Drain Current	<b>I<sub>DM</sub></b>	175	<b>A</b>
Power Dissipation TC=25°C	<b>P<sub>D</sub></b>	208	<b>W</b>
Non-Repertitive Avalanche Switching Energy	<b>E<sub>AS</sub></b>	1012	<b>mJ</b>
Short-Circuit Withstand Time	<b>t<sub>sc</sub></b>	3	<b>μs</b>
Operating Temperature Range	<b>T<sub>J</sub></b>	-40 to +175	<b>°C</b>
Storage Temperature Range	<b>T<sub>STG</sub></b>	-40 to +150	<b>°C</b>
Thermal Resistance, Junction to Case	<b>R<sub>θJC</sub></b>	0.72	<b>°C/W</b>

**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	$V_{GS} = 0 V, I_D = 100\mu A$	<b>BV<sub>DSS</sub></b>	800	-	-	<b>V</b>	
Drain-Source Leakage Current	$V_{DS} = 800 V, V_{GS} = 0 V$	<b>I<sub>DSS</sub></b>	-	1	-	<b>μA</b>	
Gate Leakage Current	$V_{GS} = +18 V, V_{DS} = 0 V$	<b>I<sub>GSS</sub></b>	-	-	250	<b>nA</b>	
	$V_{GS} = -4 V, V_{DS} = 0 V$		-	-	-250	<b>nA</b>	
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 10 mA$	<b>V<sub>GS(th)</sub></b>	2	2.6	4	<b>V</b>	
Drain-Source On-State Resistance	$V_{GS} = 18 V, I_D = 30 A$	<b>R<sub>DS(on)</sub></b>	-	33	43	<b>mΩ</b>	
	$V_{GS} = 18 V, I_D = 30 A, T_J = 175^\circ C$		-	35	-	<b>mΩ</b>	
Forward Transconductance	$V_{DS}=20V, I_D=30A$	<b>g<sub>fs</sub></b>	-	16	-	<b>s</b>	
Internal Gate Resistance	f=1MHz	<b>RG</b>	-	1.6	-	<b>Ω</b>	
Input Capacitance	$V_{DS}=600V$ $V_{GS}=0V$ f=1MHz	<b>C<sub>iss</sub></b>	-	2200	-	<b>pF</b>	
Output Capacitance		<b>C<sub>oss</sub></b>	-	196	-	<b>pF</b>	
Reverse Transfer Capacitance		<b>C<sub>rss</sub></b>	-	12	-	<b>pF</b>	
Stored Energy in Output Capacitance		<b>E<sub>oss</sub></b>	-	39	-	<b>μJ</b>	
Total Gate Charge(Note2)		$I_D = 30A$ $V_{DD}=400V$ $V_{GS} = -4/+ 18 V$	<b>Q<sub>g</sub></b>	-	105	-	<b>nC</b>
Gate to Source Charge(Note2)			<b>Q<sub>gs</sub></b>	-	28	-	<b>nC</b>
Gate to Drain Charge(Note2)	<b>Q<sub>gd</sub></b>		-	30	-	<b>nC</b>	
Turn-on Delay Time(Note2)	$V_{DS} = 400 V, I_D=30 A,$ $V_{GS} = -4/+18 V,$ $R_G = 2.5 \Omega$ $L=200\mu H$ $T_J=25^\circ C$	<b>t<sub>d(on)</sub></b>	-	13	-	<b>ns</b>	
Rise Time(Note2)		<b>t<sub>r</sub></b>	-	16	-	<b>ns</b>	
Turn-Off Delay Time(Note2)		<b>t<sub>d(OFF)</sub></b>	-	23	-	<b>ns</b>	
Fall Time(Note2)		<b>t<sub>f</sub></b>	-	7	-	<b>ns</b>	
Turn-on Switching Energy		<b>E<sub>on</sub></b>	-	82	-	<b>μJ</b>	
Turn-off Switching Energy		<b>E<sub>off</sub></b>	-	25	-	<b>μJ</b>	
Turn-on Delay Time(Note2)		$V_{DS} = 400 V, I_D=30 A,$ $V_{GS} = -4/+18 V,$ $R_G = 2.5 \Omega$ $L=200\mu H$ $T_J=175^\circ C$	<b>t<sub>d(on)</sub></b>	-	12	-	<b>ns</b>
Rise Time(Note2)			<b>t<sub>r</sub></b>	-	15	-	<b>ns</b>
Turn-Off Delay Time(Note2)			<b>t<sub>d(OFF)</sub></b>	-	26	-	<b>ns</b>
Fall Time(Note2)			<b>t<sub>f</sub></b>	-	6	-	<b>ns</b>
Turn-on Switching Energy	<b>E<sub>on</sub></b>		-	60	-	<b>μJ</b>	
Turn-off Switching Energy	<b>E<sub>off</sub></b>		-	14	-	<b>μJ</b>	
Maximun Body-Diode Continuous Current	$V_{GS} = -4 V, T_C=25^\circ C$	<b>I<sub>s</sub></b>	-	37	-	<b>A</b>	
	$V_{GS} = -4 V, T_C=100^\circ C$		-	20	-	<b>A</b>	
Maximun Body-Diode Pulsed Current(Note2)		<b>I<sub>SM</sub></b>	-	-	175	<b>A</b>	
Drain-Source Diode Forward Voltage	$V_{GS}=-4V, I_{SD}=15A T_J=175^\circ C$	<b>V<sub>SD</sub></b>	-	4.7	-	<b>V</b>	
	$V_{GS}=-4V, I_{SD}=15A T_J=175^\circ C$		-	4.2	-	<b>V</b>	
	$V_{GS}=-4V, I_{SD}=30A T_J=25^\circ C$		-	5.4	-	<b>V</b>	
	$V_{GS}=-4V, I_{SD}=30A T_J=175^\circ C$		-	48	-	<b>V</b>	
Reverse Recovery Time(Note2)	$V_{GS} = -4 V, I_{SD} = 30 A, V_R = 400V$ $di/dt=1797A/\mu s, T_J=25^\circ C$	<b>trr</b>	-	19	-	<b>ns</b>	
Reverse Recovery Charge(Note2)		<b>Qrr</b>	-	233	-	<b>nC</b>	
Peak Reverse Recovery Current		<b>Irrm</b>	-	22	-	<b>A</b>	
Reverse Recovery Time(Note2)	$V_{GS} = -4 V, I_{SD} = 30 A, V_R = 400V$ $di/dt=1797A/\mu s, T_J=175^\circ C$	<b>trr</b>	-	22	-	<b>ns</b>	
Reverse Recovery Charge(Note2)		<b>Qrr</b>	-	334	-	<b>nC</b>	
Peak Reverse Recovery Current		<b>Irrm</b>	-	26	-	<b>A</b>	

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

**RATINGS AND CHARACTERISTIC CURVES**

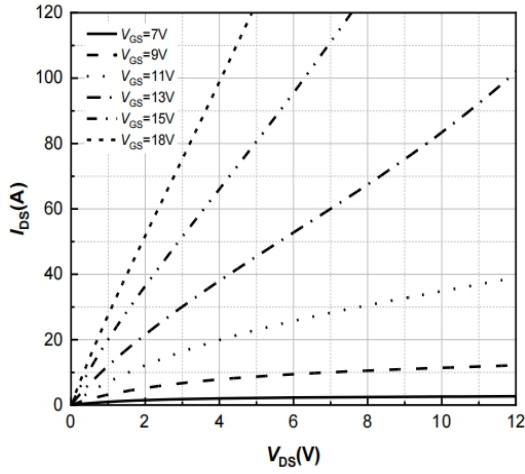


Figure 1. Output Characteristics  
 $T_j = -40^\circ\text{C}$

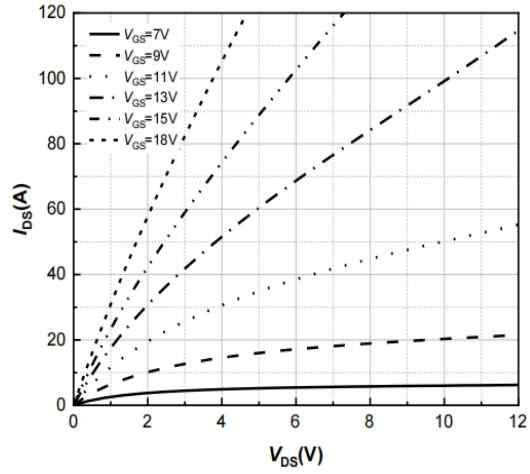


Figure 2. Output Characteristics  
 $T_j = 25^\circ\text{C}$

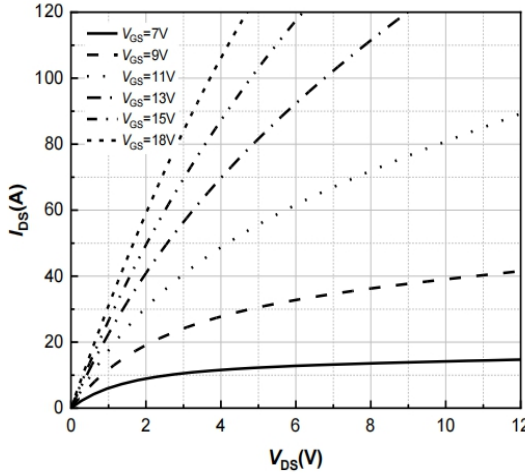


Figure 3. Output Characteristics  
 $T_j = 175^\circ\text{C}$

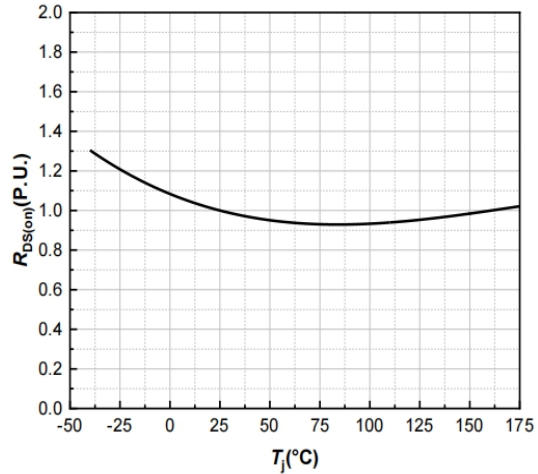


Figure 4. Normalized On-Resistance vs. Temperature

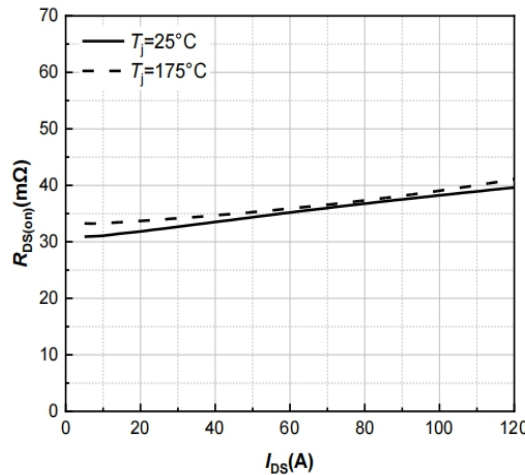


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

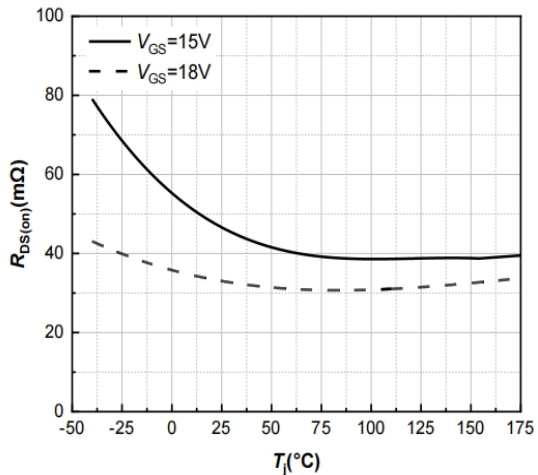
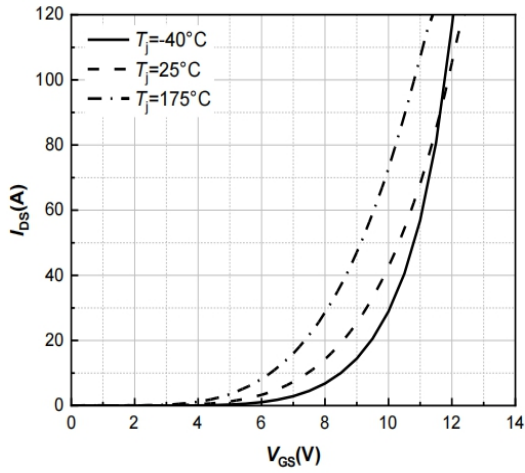
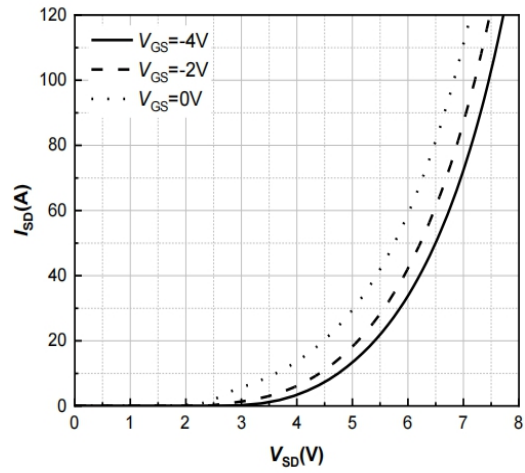


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

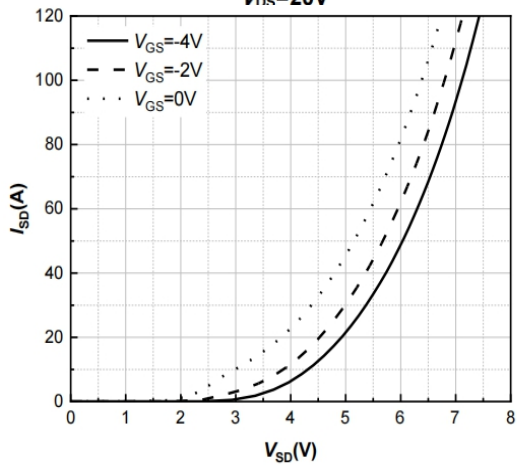
**RATINGS AND CHARACTERISTIC CURVES**



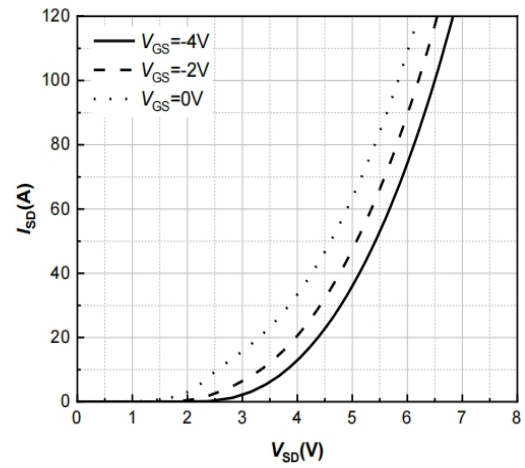
**Figure 7. Transfer Characteristic for Various Junction Temperatures**  
 $V_{DS}=20V$



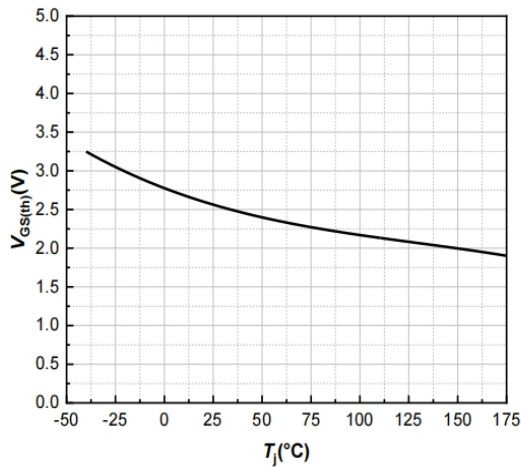
**Figure 8. Body Diode Characteristic**  
 $T_J=-40^{\circ}C$



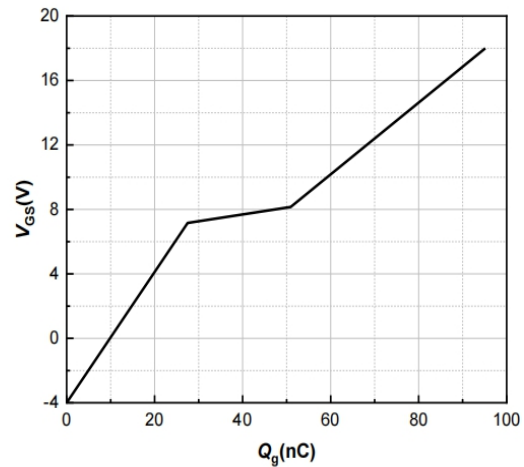
**Figure 9. Body Diode Characteristic**  
 $T_J=25^{\circ}C$



**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**

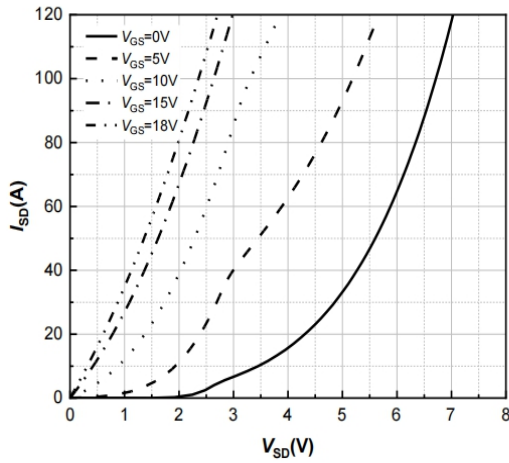


Figure 13. 3rd Quadrant Characteristic  
 $T_j = -40^\circ\text{C}$

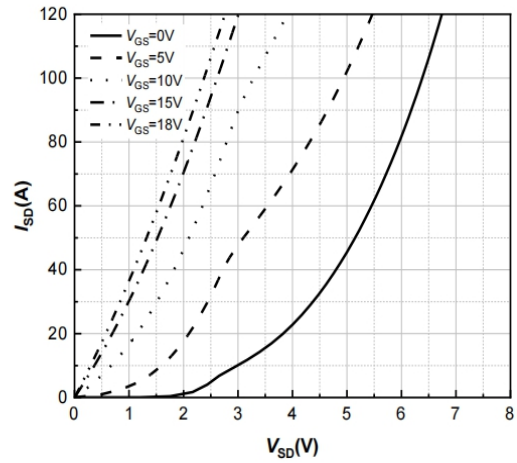


Figure 14. 3rd Quadrant Characteristic  
 $T_j = 25^\circ\text{C}$

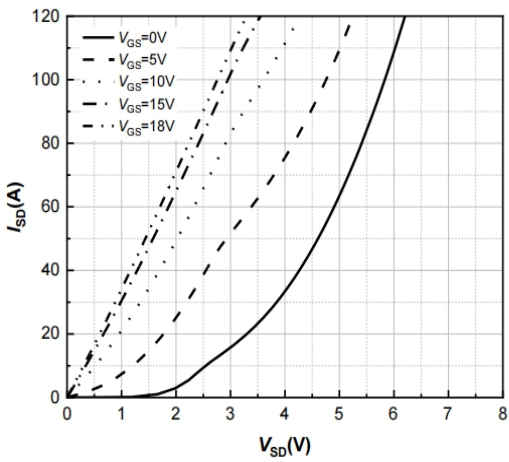


Figure 15. 3rd Quadrant Characteristic  
 $T_j = 175^\circ\text{C}$

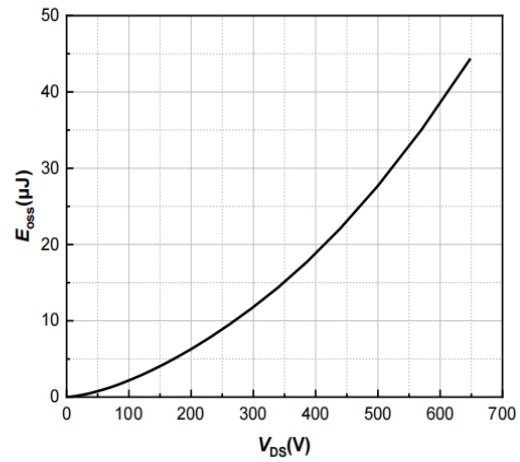


Figure 16. Output Capacitor Stored Energy

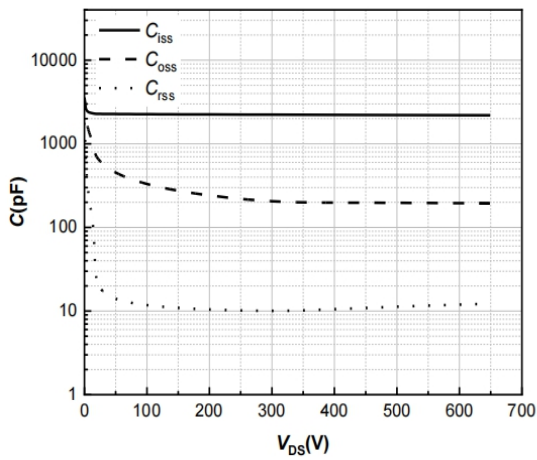
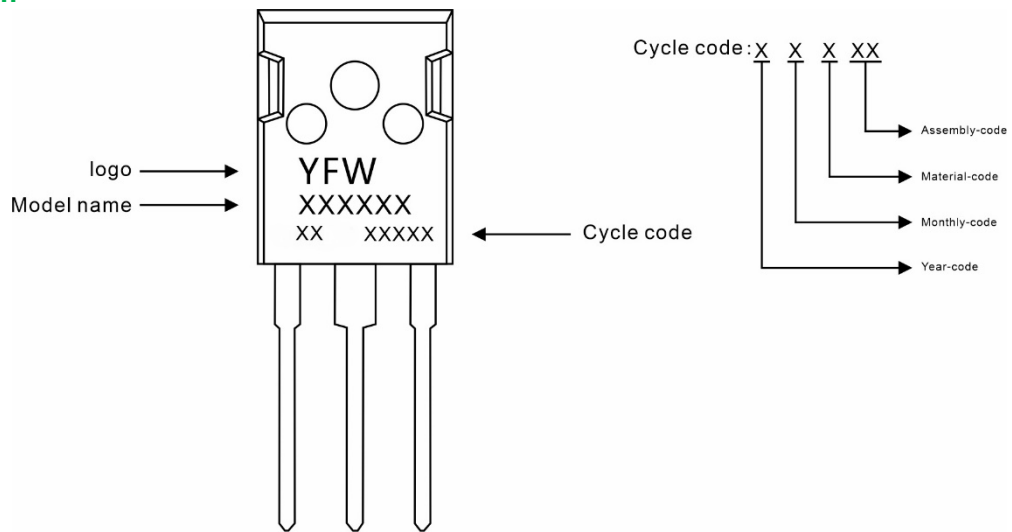


Figure 17. Capacitances vs. Drain-Source

**Marking Diagram**



**Ordering information**

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWM3033080APG3	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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