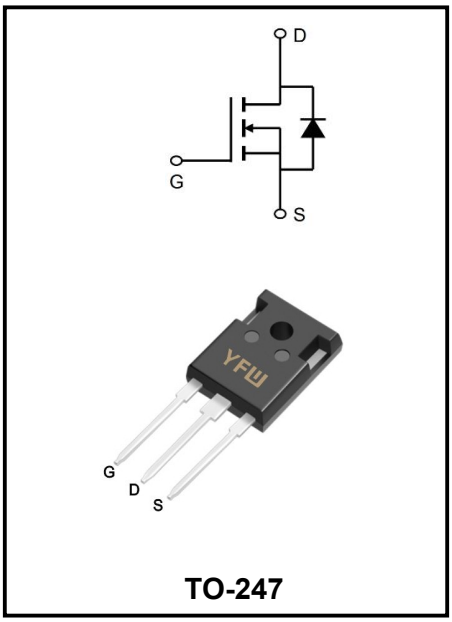
800V SiC N-Channel MOSFET

MAIN CHARACTERISTICS

I_D	53A
V_{DS}	800V
R_{DSON}-typ (@V_{GS}=18V T_C=25°C)	＜73mΩ(Typ:53mΩ)



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 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	53	A
Continue Drain Current Tc=100℃		28	
Pulsed Drain Current	I_{DM}	80	A
Power Dissipation TC=25℃	P_D	98	W
Operating Temperature Range	T_J	-40 to +175	°C
Storage Temperature Range	T_{STG}	-40 to +175	°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.1	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	°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 = 5 mA	$V_{GS(th)}$	2	2.7	4	V
Drain-Source On-State Resistance	V_{GS} = 18 V, I_D = 20 A	$R_{DS(ON)}$	-	53	73	mΩ
	V_{GS} = 18 V, I_D = 20A,T_J = 175℃		-	58	-	mΩ
Internal Gate Resistance	f=1MHz	RG	-	2.1	-	Ω
Input Capacitance	V_{DS}=600V V_{GS}=0V f=1MHz	C_{iss}	-	1301	-	pF
Output Capacitance		C_{oss}	-	138	-	
Reverse Transfer Capacitance		C_{rss}	-	14	-	
Total Gate Charge(Note2)	I_D =20A V_{DD}=400V V_{GS} =-4/+ 18 V	Q_g	-	68	-	nC
Gate to Source Charge(Note2)		Q_{gs}	-	17	-	
Gate to Drain Charge(Note2)		Q_{gd}	-	22	-	
Turn-on Delay Time(Note2)	V_{DS} = 400 V, I_D=20 A, V_{GS} = -4/+18 V, R_G = 2.5 Ω L=200μH	$t_{d(on)}$	-	13	-	ns
Rise Time(Note2)		t_r	-	20	-	
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	20	-	
Fall Time(Note2)		t_r	-	9	-	
Turn-on Switching Energy		E_{on}	-	108	-	μJ
Turn-off Switching Energy		E_{off}	-	35	-	μJ
Maximun Body-Diode Continuous Current	V_{GS} = -4 V, Tc=25°C	I_S	-	33	-	A
	V_{GS} = -4 V, Tc=100°C		-	18	-	A
Maximun Body-Diode Pulsed Current(Note2)		I_{SM}	-	-	80	A
Drain-Source Diode Forward Voltage	V_{GS}=-4V,I_{SD}=10A Tj=25°C	V_{SD}	-	4.6	-	V
	V_{GS}=-4V,I_{SD}=10A Tj=175°C		-	4	-	V
	V_{GS}=-4V,I_{SD}=20A Tj=25°C		-	5.4	-	V
	V_{GS}=-4V,I_{SD}=20A Tj=175°C		-	4.6	-	V
Reverse Recovery Time(Note2)	V_{GS} = -4 V， I_{SD}= 20 A,V_R =400V di/dt=989A/μs	trr	-	18	-	ns
Reverse Recovery Charge(Note2)		Qrr	-	104	-	nC
Peak Reverse Recovery Current		Irrm	-	10.2	-	A

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

RATINGS AND CHARACTERISTIC CURVES

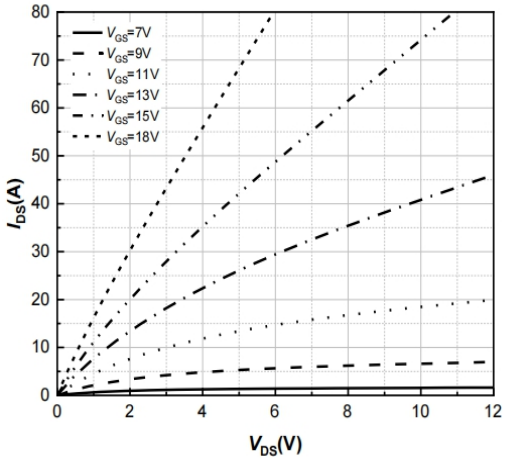


Figure 1. **Output Characteristics T_j=-40°C**

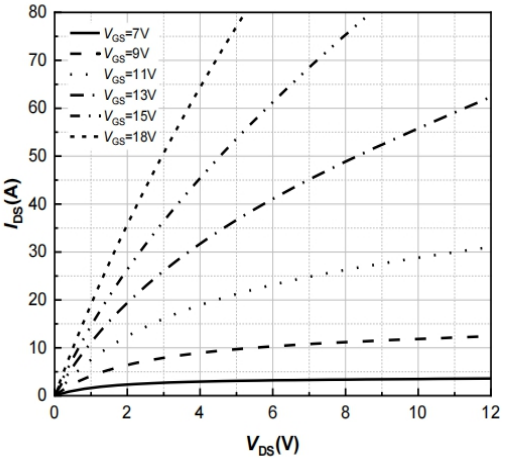


Figure 2. **Output Characteristics T_j=25°C**

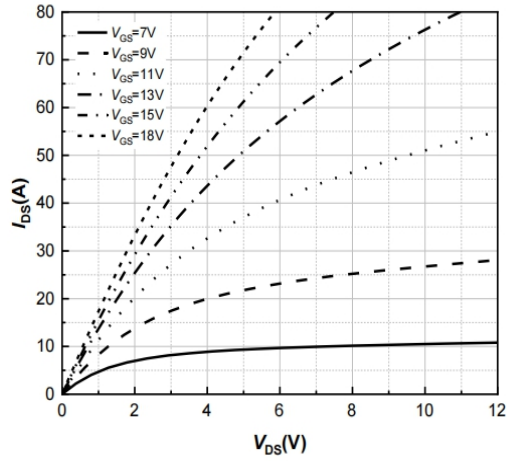


Figure 3. **Output Characteristics T_j=175°C**

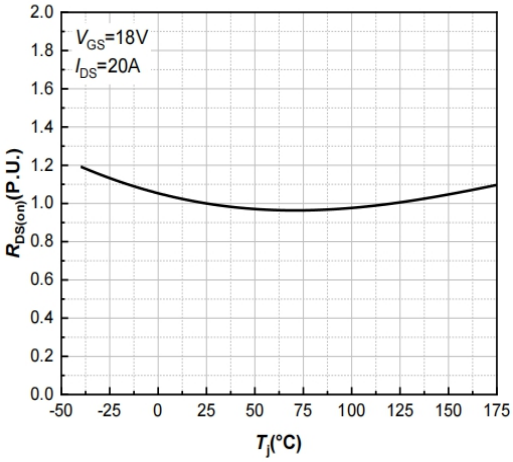


Figure 4. **Normalized On-Resistance vs. Temperature**

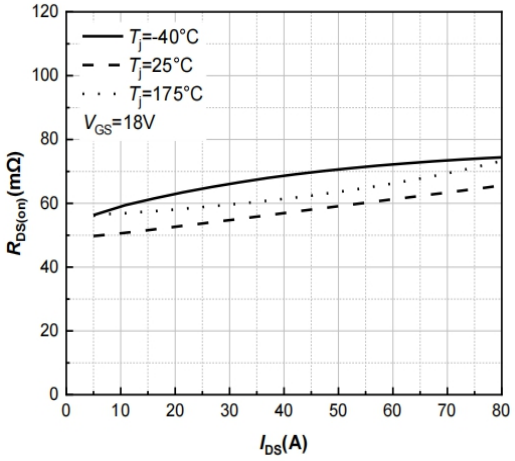


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

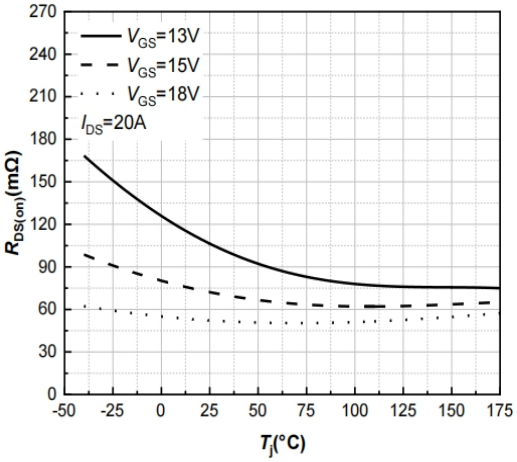


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

RATINGS AND CHARACTERISTIC CURVES

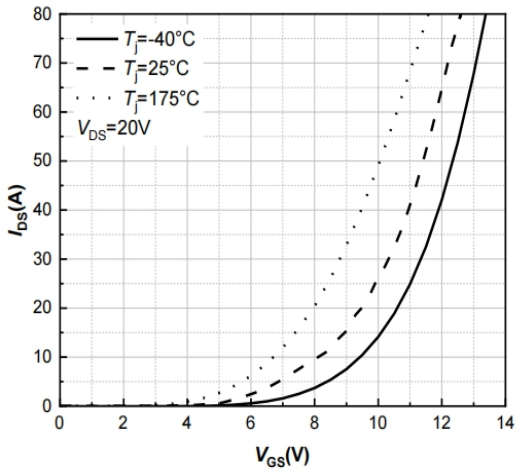


Figure 7. **Transfer Characteristic for Various Junction Temperatures**

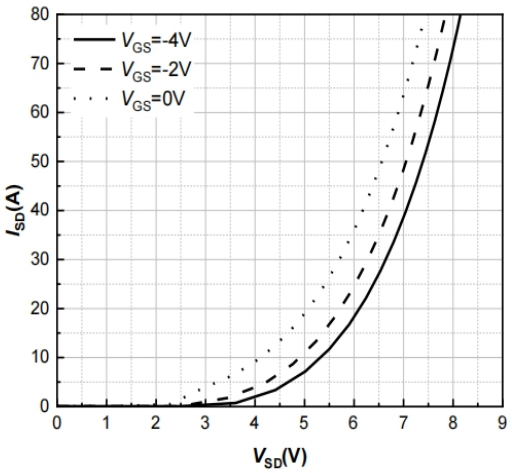


Figure 8. **Body Diode Characteristic T_j=-40°C**

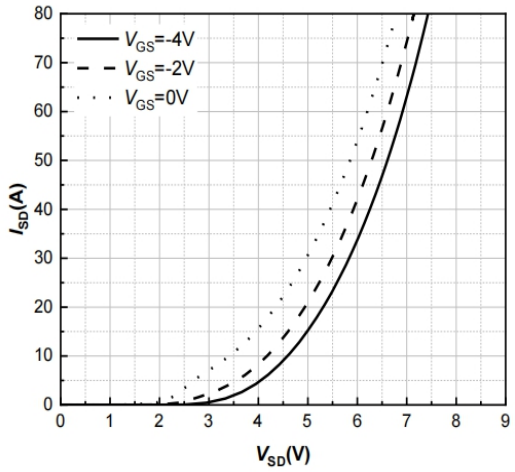


Figure 9. **Body Diode Characteristic T_j=25°C**

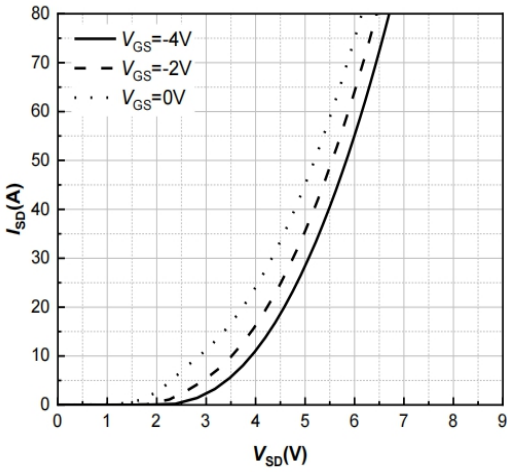


Figure 10. **Body Diode Characteristic T_j=175°C**

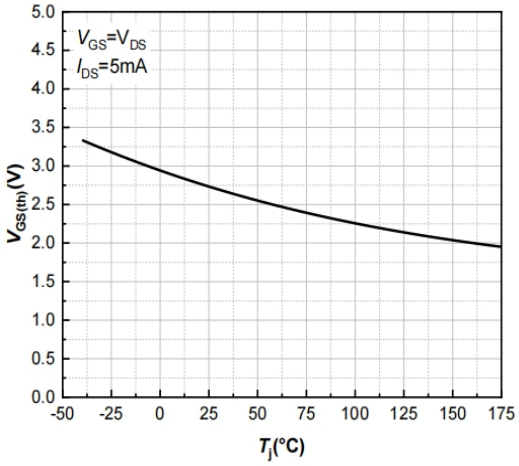


Figure 11. **Threshold Voltage vs. Temperature**

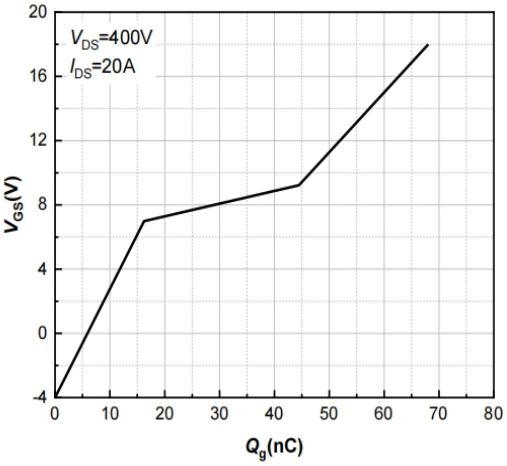


Figure 12. **Gate Charge Characteristics**

RATINGS AND CHARACTERISTIC CURVES

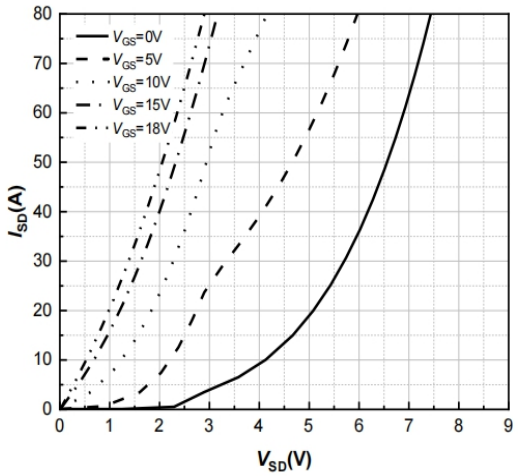


Figure 13. **3rd Quadrant Characteristic T_j=-40°C**

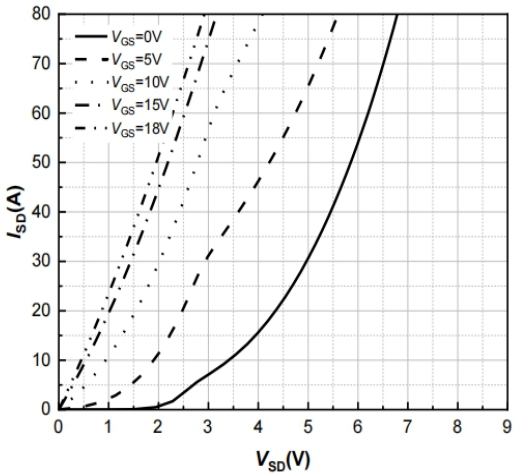


Figure 14. **3rd Quadrant Characteristic T_j=25°C**

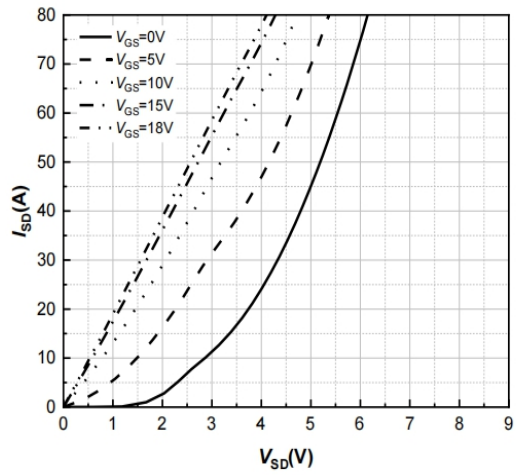


Figure 15. **3rd Quadrant Characteristic T_j=175°C**

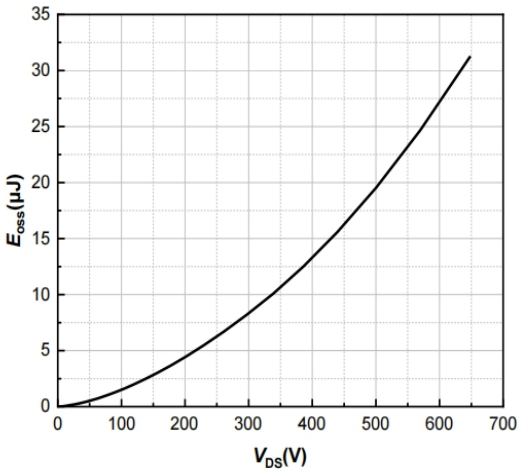


Figure 16. **Output Capacitor Stored Energy**

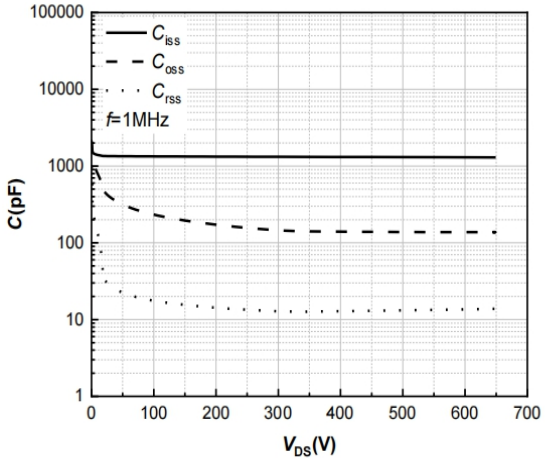


Figure 17. **Capacitances vs. Drain-Source**

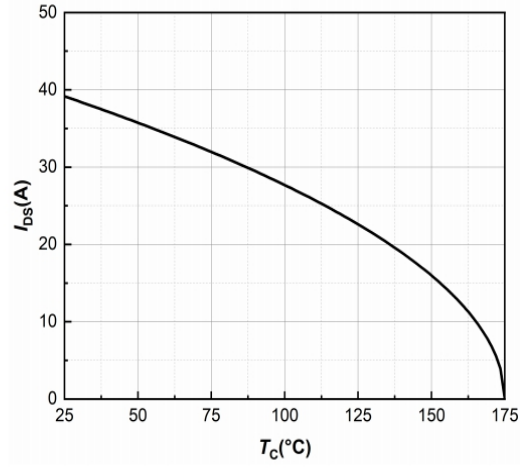


Figure 18. **Continuous Drain Current Derating vs. Case Temperature**

RATINGS AND CHARACTERISTIC CURVES

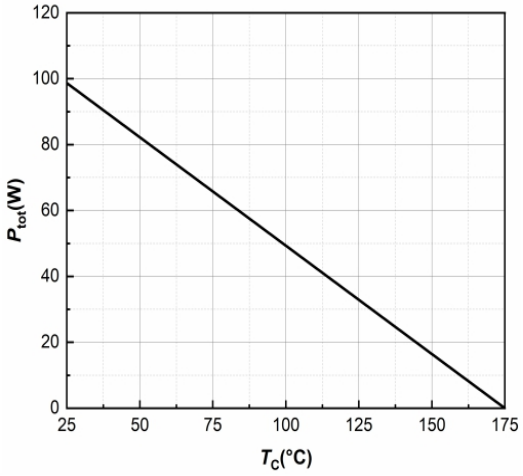


Figure 19. **Maximum Power Dissipation Derating vs. Case Temperature**

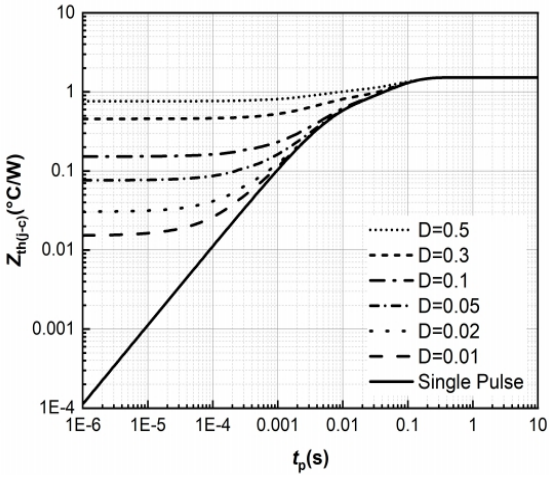


Figure 20. **Transient Thermal Impedance**

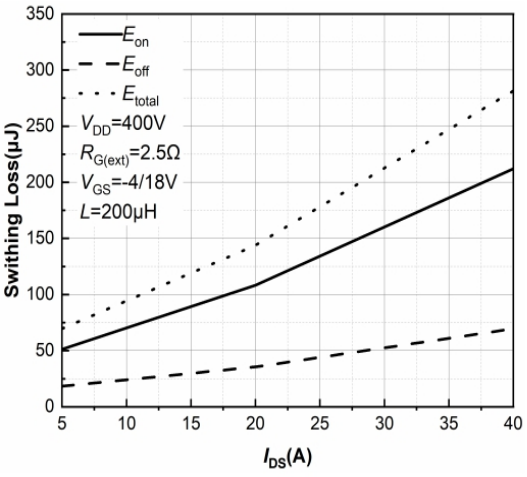


Figure 21. **Clamped Inductive Switching Energy vs. Drain Current**

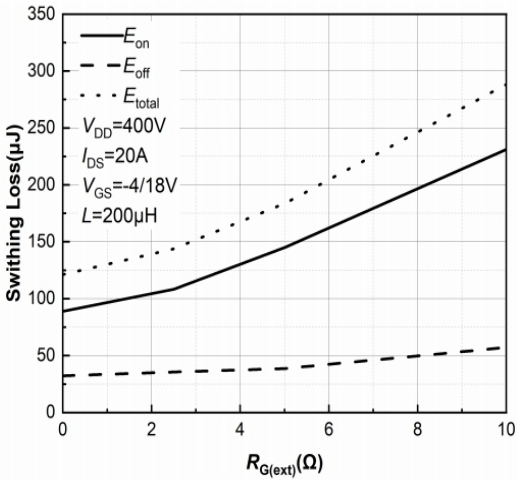


Figure 22. **Clamped Inductive Switching Energy vs. $R_{G(ext)}$**

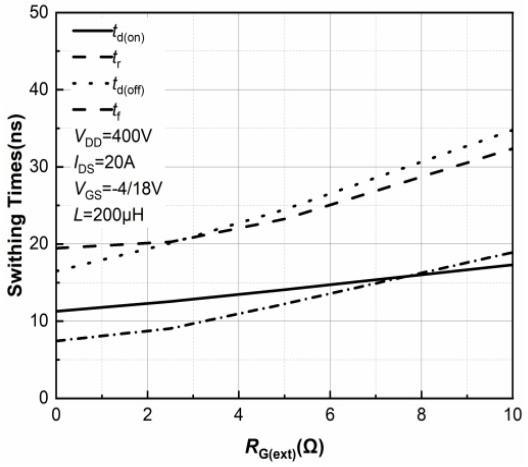


Figure 23. **Switching Times vs. $R_{G(ext)}$**

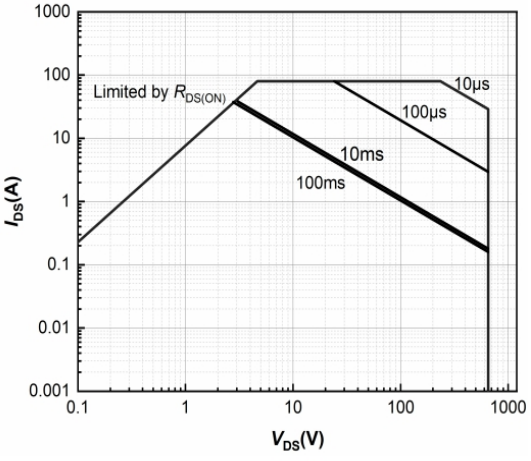
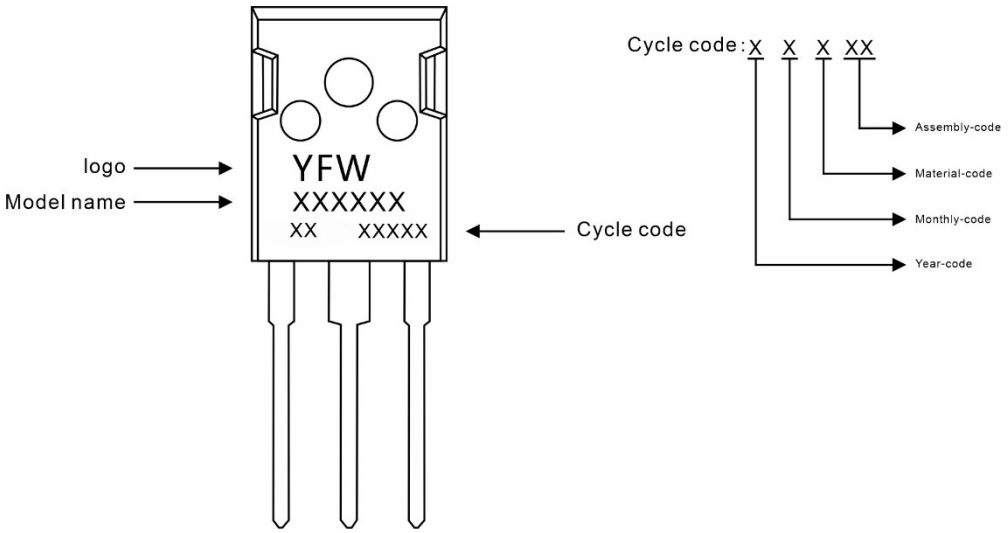


Figure 24. **Safe Operating Area**

Marking Diagram

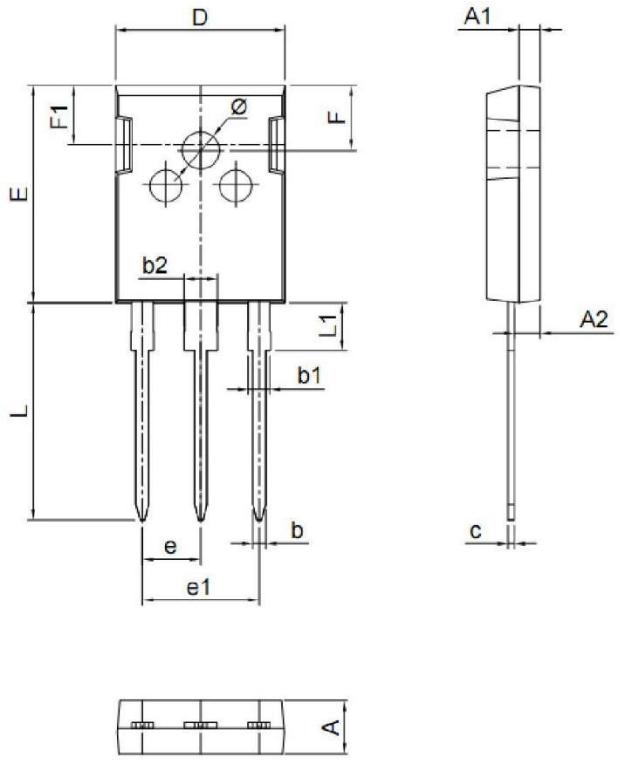


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWM305365APG3	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

Disclaimer

The information presented in this document is for reference only. GuangDong Youfeng Microelectronics Co.,Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise. The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices),YFW or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale. This publication supersedes & replaces all information previously supplied. For additional information, please visit our website https://www.yfwdiode.com, or consult YFW sales office for further assistance.