V_{DSS}	1200V
I_D	43 A
$R_{DS(ON)}$	59 mΩ

FEATURES

- High Speed Switching
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to Parallel
- Simple to Drive
- RoHS Compliant

BENEFITS

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

GK XXX
K2R059

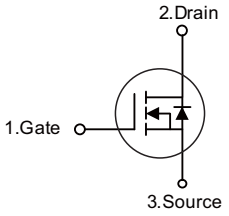
LOGO GK XXX CODE
K2 R 059
VDSS $R_{DS(on)}$

APPLICATION

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

TO-247-3





ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit
V_{DS}	Drain-Source Voltage		1200	V
I_D	Continuous Drain Current	T_c=25°C T_c=100°C	43 31	A
I_{DM}	Peak Drain Current	Pulse width t_p limited by T_{jmax}	105	A
V_{GSmax}	Gate-Source Voltage		-8/+22	V
V_{GSop}	Recommend Gate-Source Voltage		-4/+18	V
P_{tot}	Power Dissipation	T_c=25°C T_c=100°C	234 117	W
T_j	Operating Junction Temperature		-40~175	°C
T_{stg}	Storage Temperature		-40~175	°C

ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D=100μA, V_{GS}=0V	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=1200V, V_{GS}=0V		1	100	μA
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V, V_{GS}=18V			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=5mA T_j=25°C T_j=150°C T_j=175°C	2	2.8 2.2 2.1	4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=15V, I_D=20A T_j=25°C T_j=175°C V_{GS}=18V, I_D=20A T_j=25°C T_j=150°C T_j=175°C		 72 95 59 81 90	 93	mΩ

Dynamic Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{DS}=1000V, f=1MHz, V_{GS}=0V		2415		pF
C_{oss}	Output Capacitance			79		pF
C_{rss}	Reverse Transfer Capacitance			6		pF
$R_{G(int)}$	Internal Gate Resistance	f=1MHz		0.98		Ω
Q_g	Total Gate Charge	V_{DS}=800V, I_D=20A, V_{GS}=-4/18V		103		nC
Q_{gs}	Gate to Source Charge			29		nC
Q_{gd}	Gate to Drain Charge			36		nC

Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance from Junction to Case		0.64		°C/W

ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=800V, I_D=20A, V_{GS}=-4V/18V, $R_{G(ext)}$=0Ω, L=200uH		16		ns
t_r	Rise Time			17		ns
$t_{d(off)}$	Turn-Off Delay Time			22		ns
t_f	Fall Time			9		ns
E_{on}	Turn-On Energy			230		μJ
E_{off}	Turn-Off Energy			27		μJ

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{SD}	Diode Forward Voltage	V_{GS}=-4V, I_{SD}=20A T_j=25°C T_j=175°C		 4.6 4.2		V
I_S	Continuous Diode Forward Current	V_{GS}=-4V T_c=25°C T_c=100°C		 43 23		A
t_{rr}	Reverse Recovery Time	V_{GS}=-4V, I_{SD}=20A, V_R=800V, di/dt=5476A/μs		8		ns
Q_{rr}	Reverse Recovery Charge			94		nC
I_{rrm}	Peak Reverse Recovery Current			18		A

RATING AND CHARACTERISTIC CURVES

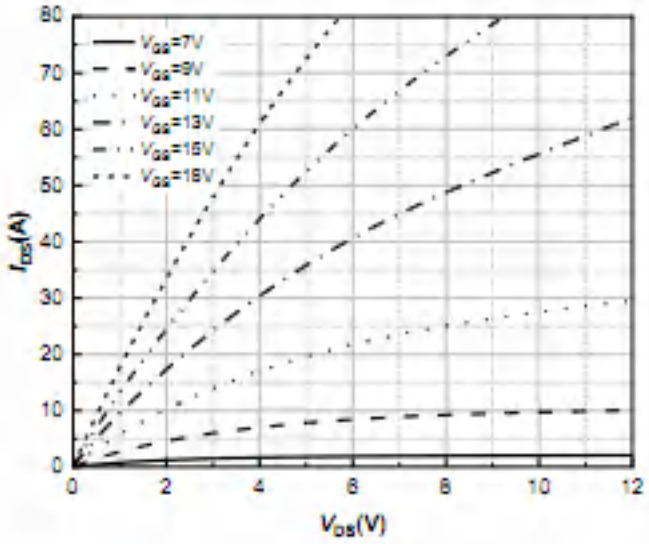


Figure 1. **Output Characteristics T_j=-40°C**

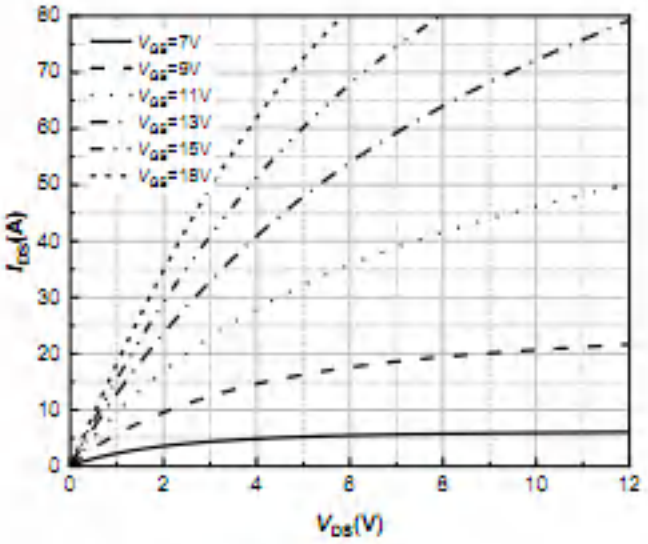


Figure 2. **Output Characteristics T_j=25°C**

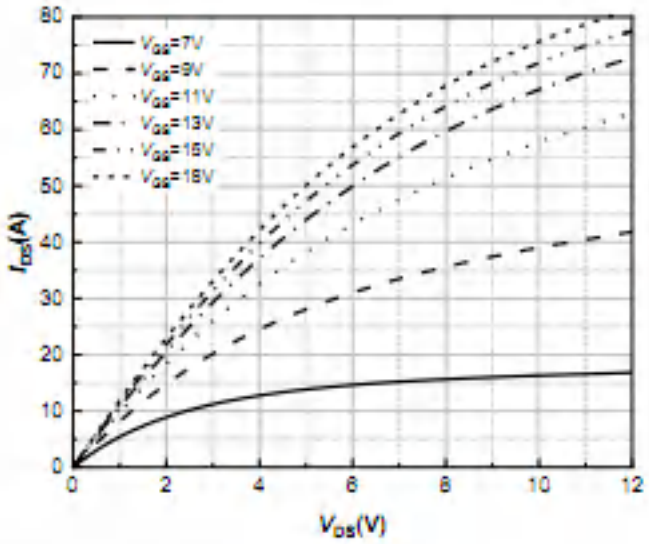


Figure 3. **Output Characteristics T_j=175°C**

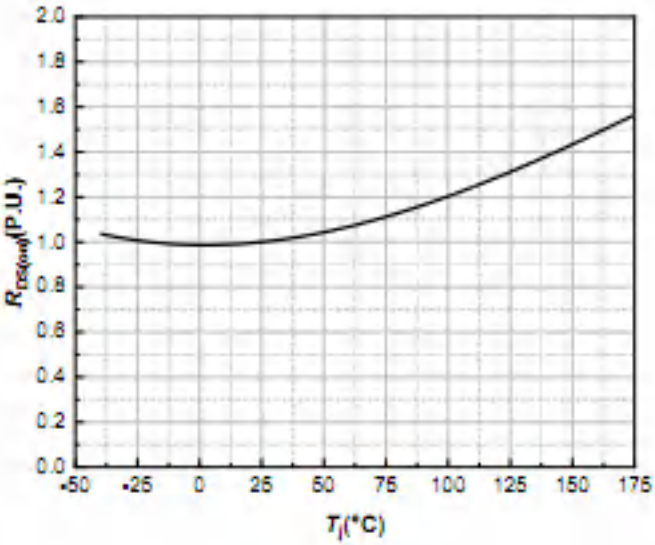


Figure 4. **Normalized On-Resistance vs. Temperature**

RATING AND CHARACTERISTIC CURVES

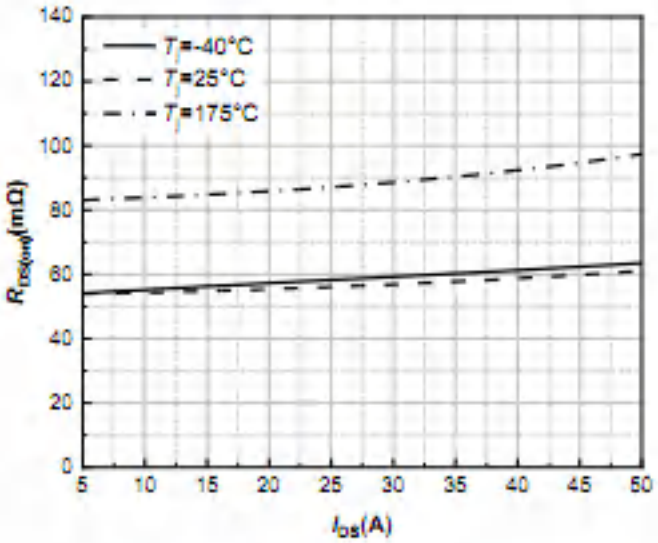


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

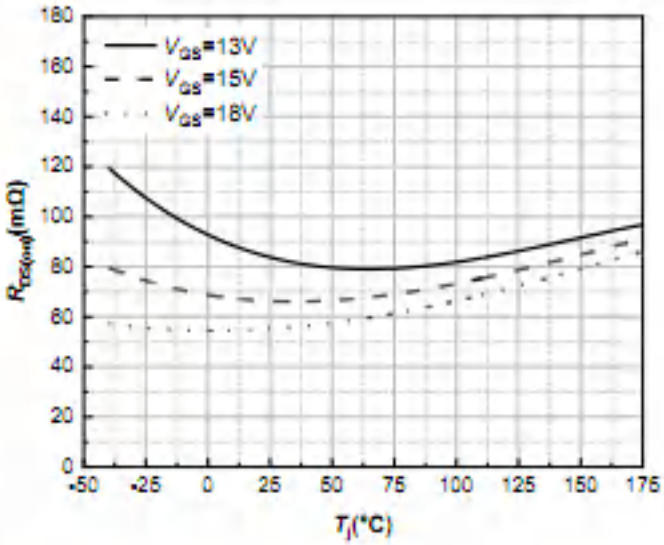


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

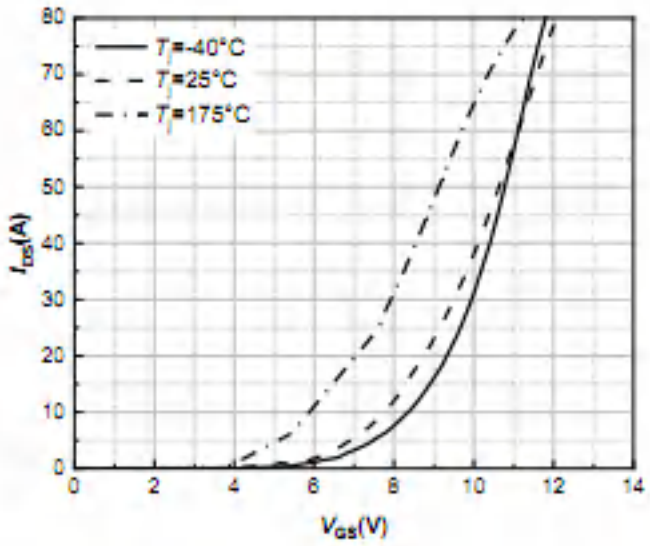


Figure 7. **Transfer Characteristic for Various Junction Temperatures V_{DS}=20V**

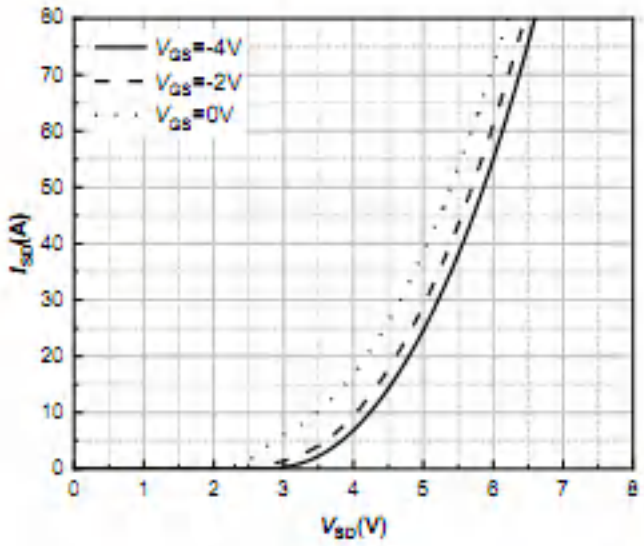


Figure 8. **Body Diode Characteristic T_j=-40°C**

RATING AND CHARACTERISTIC CURVES

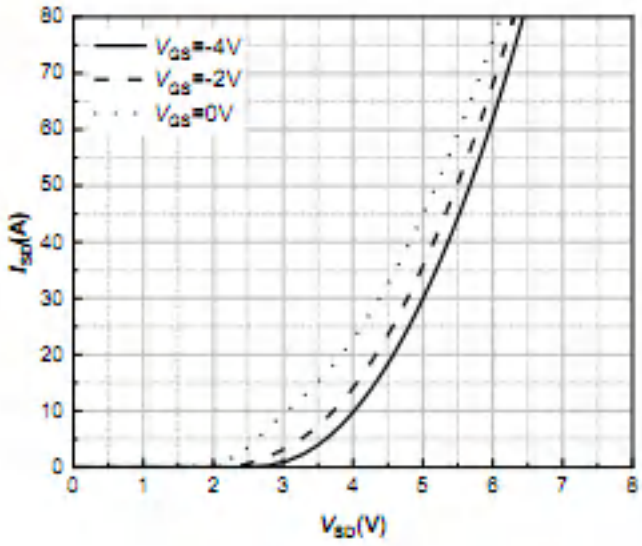


Figure 9. **Body Diode Characteristic T_j=25°C**

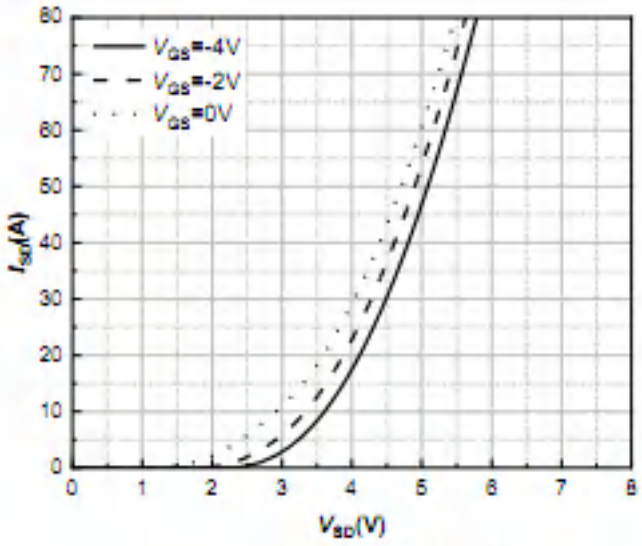


Figure 10. **Body Diode Characteristic T_j=175°C**

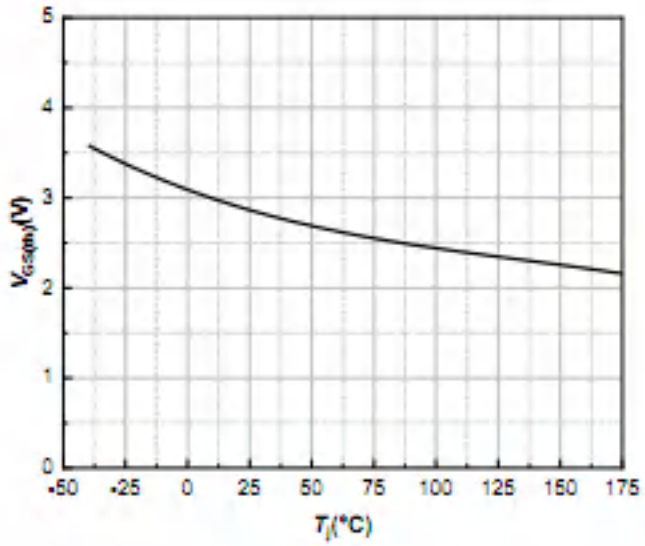


Figure 11. **Threshold Voltage vs. Temperature**

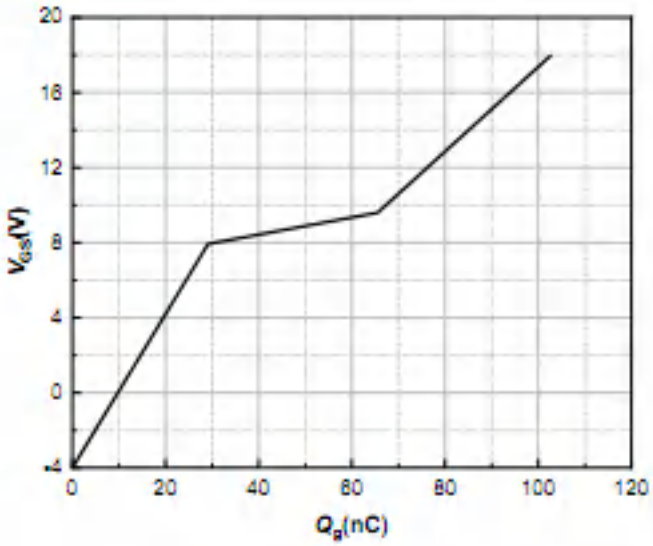


Figure 12. **Gate Charge Characteristics**

RATING AND CHARACTERISTIC CURVES

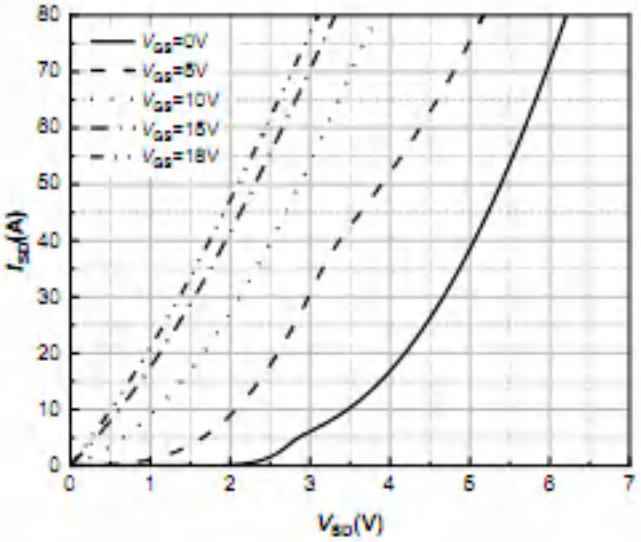


Figure 13. **3rd Quadrant Characteristic T_j=-40°C**

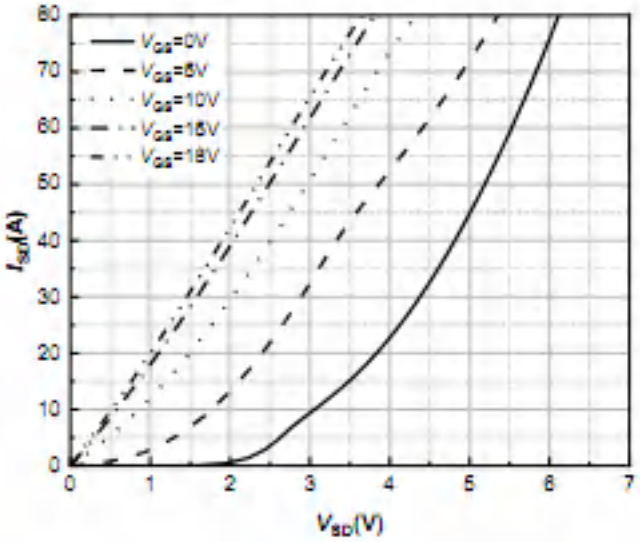


Figure 14. **3rd Quadrant Characteristic T_j=25°C**

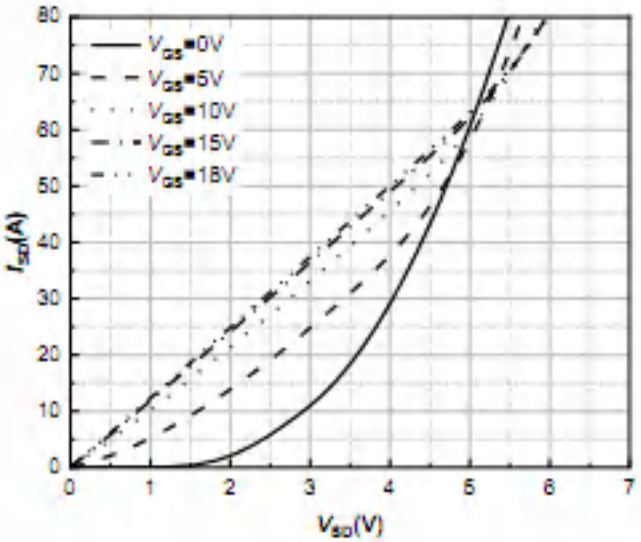


Figure 15. **3rd Quadrant Characteristic T_j=175°C**

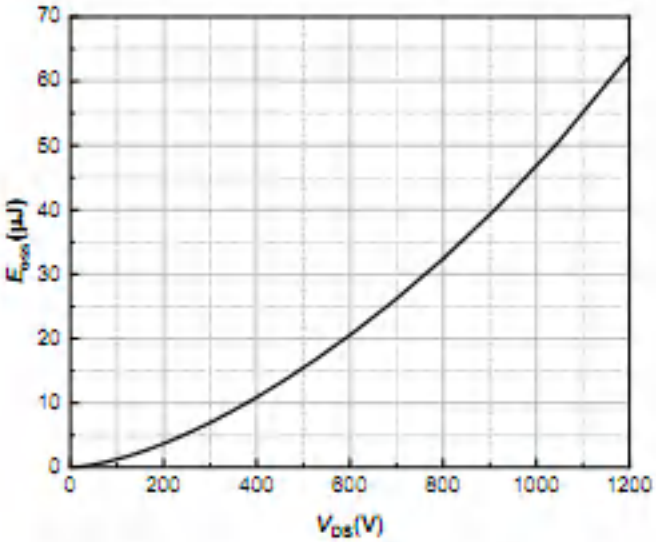


Figure 16. **Output Capacitor Stored Energy**

RATING AND CHARACTERISTIC CURVES

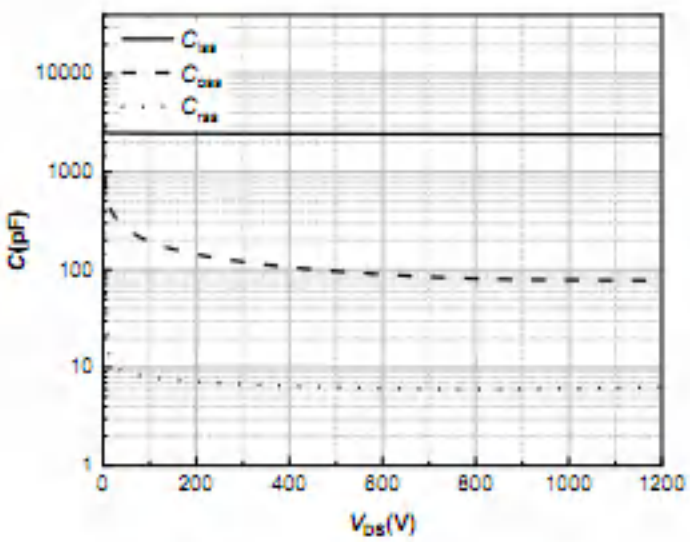


Figure 17. **Capacitances vs. Drain-Source**

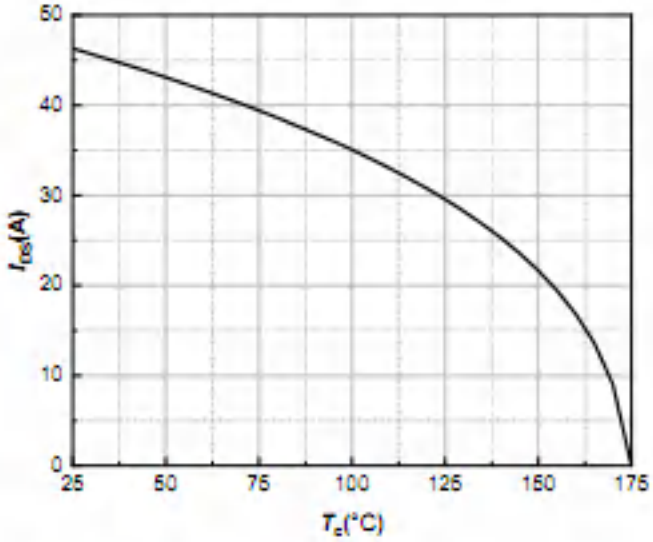


Figure 18. **Continuous Drain Current Derating vs. Case Temperature**

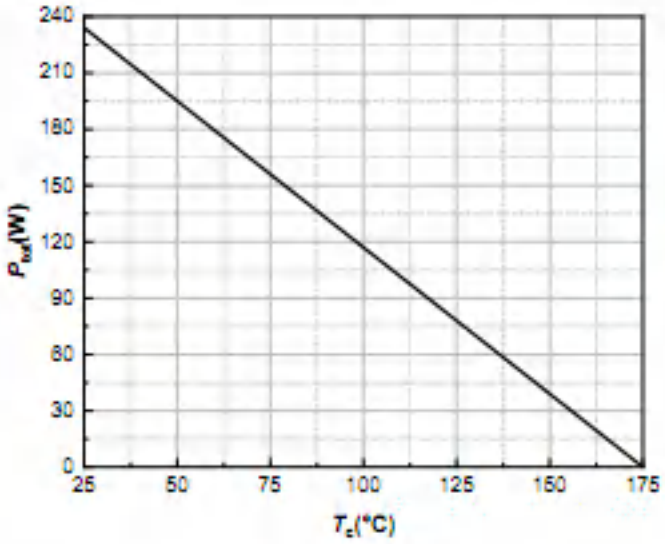


Figure 19. **Maximum Power Dissipation Derating vs. Case Temperature**

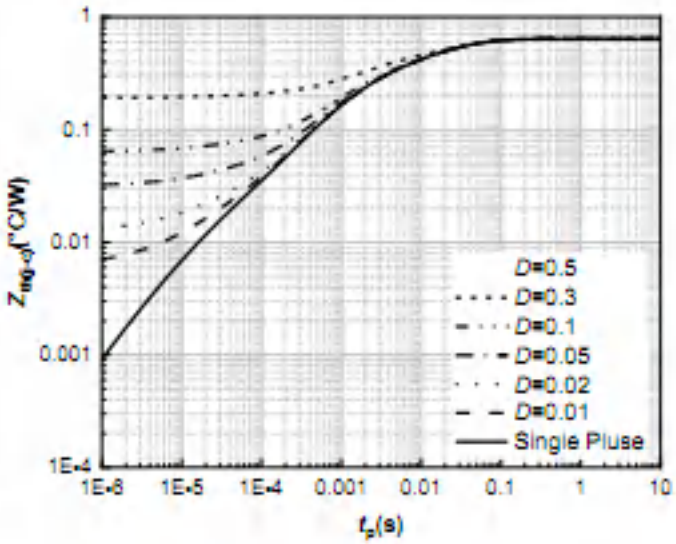


Figure 20. **Transient Thermal Impedance**

RATING AND CHARACTERISTIC CURVES

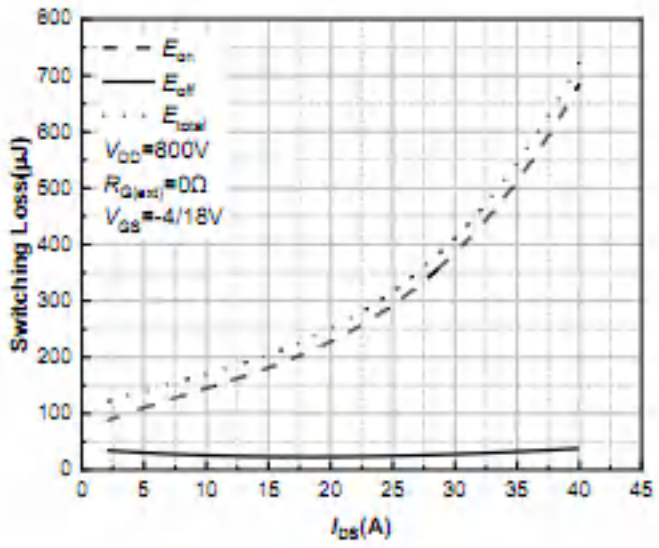


Figure 21. **Clamped Inductive Switching Energy vs. Drain Current**

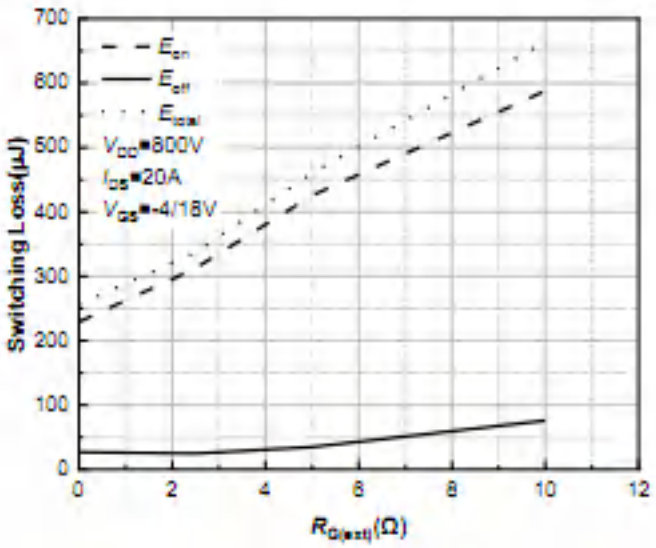


Figure 22. **Clamped Inductive Switching Energy vs. $R_{G(ext)}$**

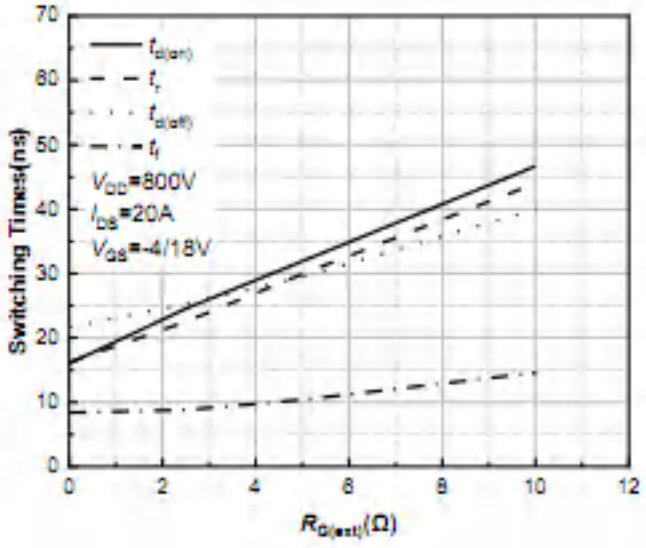


Figure 23. **Switching Times vs. $R_{G(ext)}$**

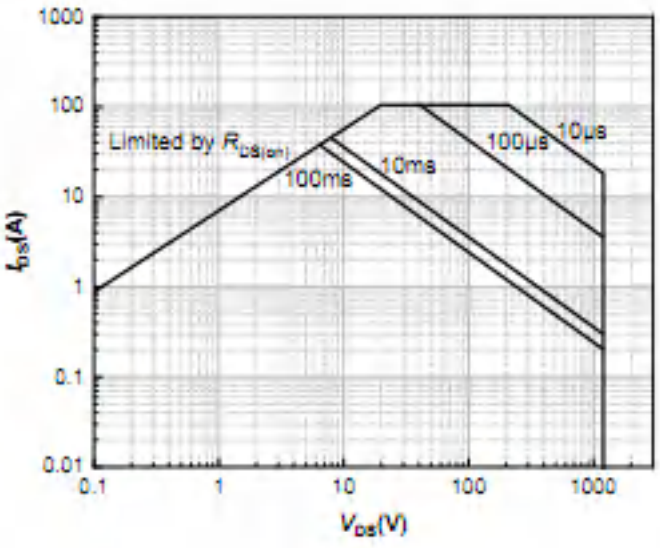
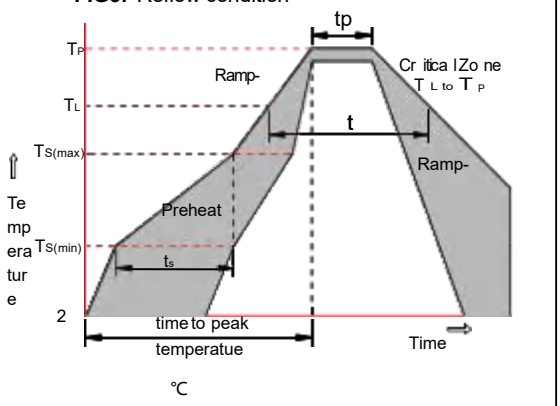


Figure 24. **Safe Operating Area**

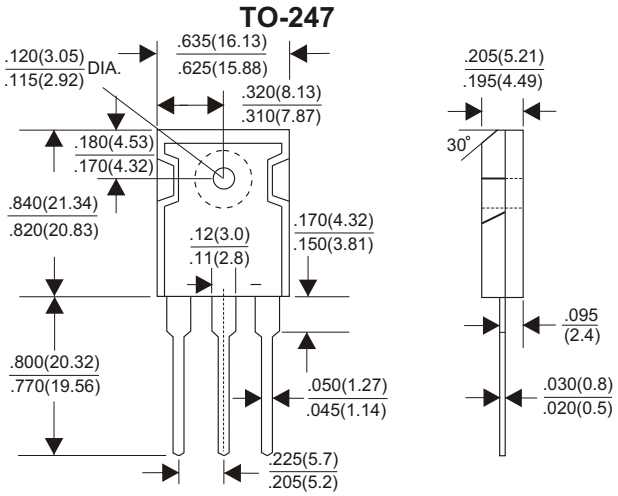
Soldering parameters

Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

FIG5: Reflow condition



Package Dimensions & Suggested Pad Layout



Dimensions in inches and (millimeters)