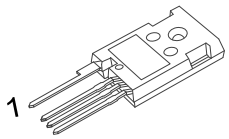
USC065R033A

Power MOSFET

72A, 650V N-CHANNEL SILICON CARBIDE PLANAR ENHANCEMENT POWER MOSFET



TO-247-4

■ DESCRIPTION

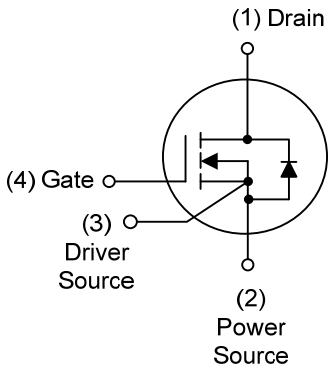
SiC The material can achieve high voltage with most carrier devices (MOSFET) with fast device structure characteristics, so it can realize the three characteristics of "high voltage", "low on resistance" and "high frequency" at the same time.

It is widely used in electric vehicle charger, industrial equipment power supply, efficient power regulator inverter and rectification part and other uses.

■ FEATURES

* $R_{DS(ON)}$ = 33 mΩ @ V_{GS}=18V, I_D=30A
* Wide bandgap SiC MOSFET technology
* High Speed Switching with Low Capacitances
* Easy to Parallel
* Low reverse recovery (Qrr)
* Power Factor Correction Modules
* Switch mode power supplies
* DC-AC Inverters
* On Board Charger
* High voltage DC/DC converters

■ SYMBOL



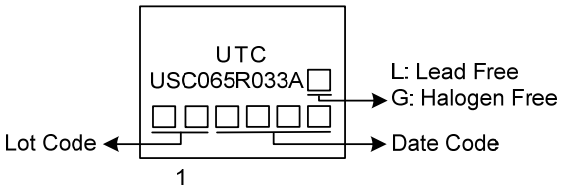
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment				Packing
Lead Free	Halogen Free		1	2	3	4	
USC065R033AL-T474-T	USC065R033AG-T474-T	TO-247-4	D	S	S	G	Tube

Note: Pin Assignment: D: Drain S: Source G: Gate

USC065R033AG-T474-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) T474: TO-247-4 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	650	V
Gate-Source Voltage	Dynamic		V_{GSS}	-8 / +22	V
	Static			-4 / +18	V
Drain Current	Continuous	V_{GS}=18V T_C=25°C	I_D	72	A
		V_{GS}=18V T_C=100°C		51	A
	Pulsed (Note 2)		I_{DM}	175	A
Power Dissipation		T_C=25°C	P_D	208	W
		T_C=100°C		104	W
Junction Temperature			T_J	-40 ~ +175	°C
Storage Temperature			T_{STG}	-40 ~ +175	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.

■ THERMAL DATA

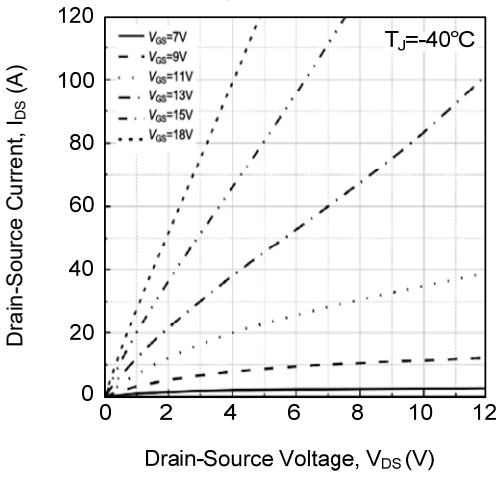
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	50	°C/W
Junction to Case	θ_{JC}	0.72	°C/W

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

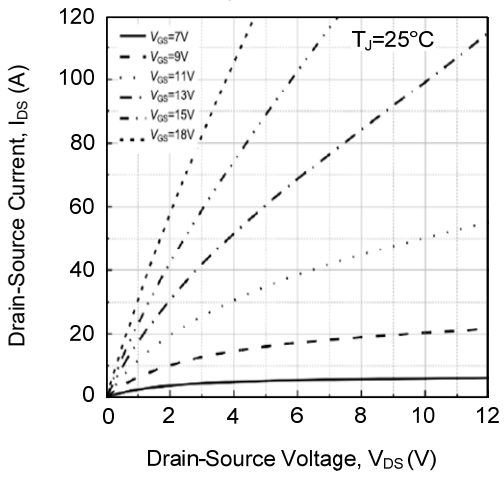
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=100μA, V_{GS}=0V	650			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V		1		μA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=18V, V_{DS}=0V			250	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=10mA	2.0	2.6	4.0	V
		V_{DS}=V_{GS}, I_D=10mA T_J=175°C		1.9		V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=18V, I_D=30A		33		mΩ
		V_{GS}=18V, I_D=30A, T_J=175°C		35		mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=600V, V_{GS}=0V, f=1MHz		2200		pF
Output Capacitance	C_{OSS}			196		pF
Reverse Transfer Capacitance	C_{RSS}			12		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS}=400V, V_{GS}=-4V / +18V, I_D=30A		105		nC
Gate to Source Charge	Q_{GS}			28		nC
Gate to Drain Charge	Q_{GD}			30		nC
Internal Gate Input Resistance	$R_{G(int)}$	f=1MHz		1.6		Ω
Turn-on switching energy	E_{ON}	V_{DS}=400V, V_{GS}=-4V / +18V, I_D=30A, $R_{G(ext)}$=2.5Ω, L=200μH		49		μJ
Turn-off switching energy	E_{OFF}			65		μJ
Turn-ON Delay Time	$t_{D(ON)}$			12		ns
Rise Time	t_R			16		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			23		ns
Fall-Time	t_F			7		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=-4.0V, I_{SD}=15A, T_J=25°C		4.7		V
		V_{GS}=-4.0V, I_{SD}=15A, T_J=175°C		4.2		V
		V_{GS}=-4.0V, I_{SD}=30A, T_J=25°C		5.4		V
		V_{GS}=-4.0V, I_{SD}=30A, T_J=175°C		4.8		V
Continuous Diode Forward Current	I_S	V_{GS}=-4.0V		37		A
		V_{GS}=-4.0V, T_J=100°C		20		A
Body Diode Reverse Recovery Time	t_{rr}	V_{GS}=-4.0V, I_{SD}=30A, V_R=400V, d_{IF}/dt=1797A/μs		19		ns
Body Diode Reverse Recovery Charge	Q_{rr}			233		nC
Peak Reverse Recovery Current	I_{rrm}			22		A

■ TYPICAL CHARACTERISTICS

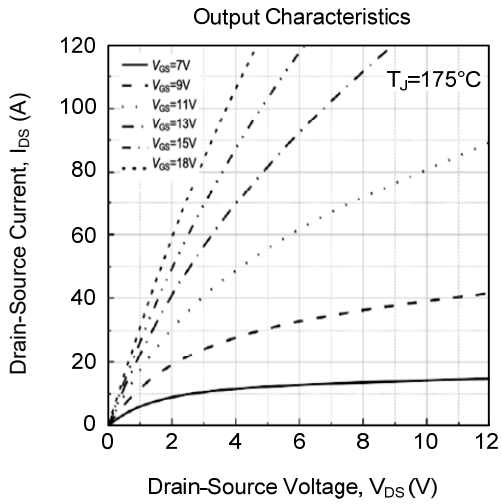
Output Characteristics



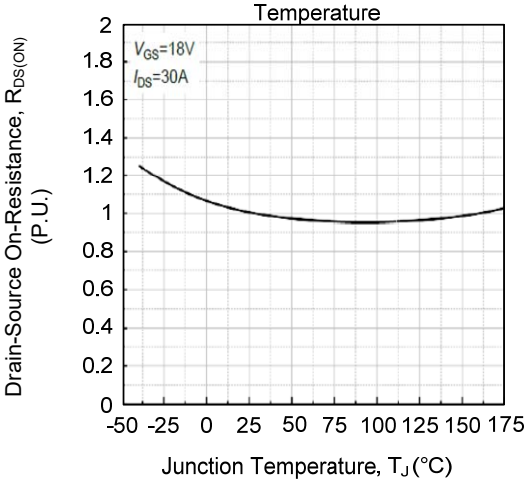
Output Characteristics



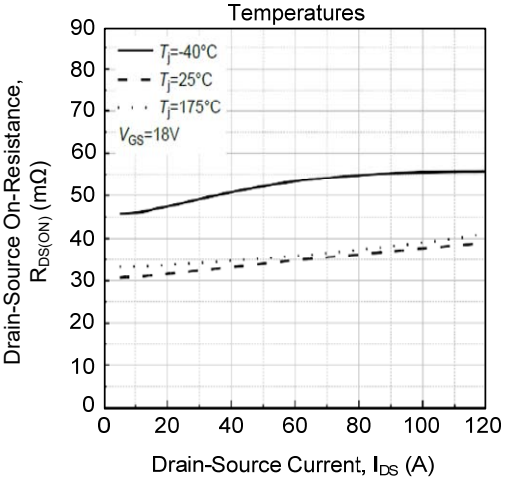
Output Characteristics



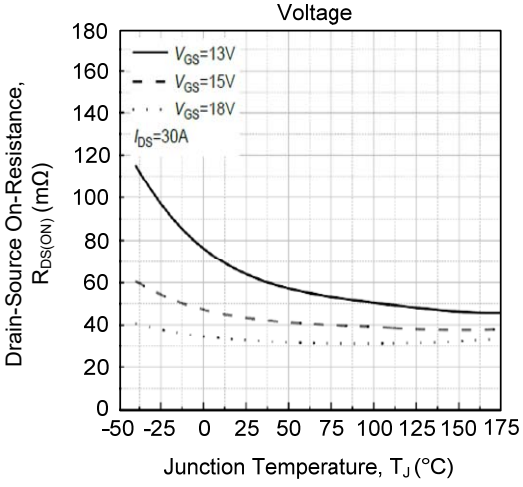
Normalized Drain-Source On-Resistance vs. Junction Temperature



Drain-Source On-Resistance vs. Drain Current For Various Temperatures

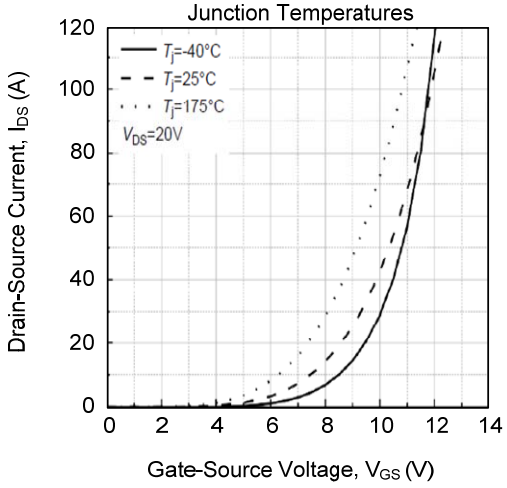


Drain-Source On-Resistance vs. Temperature For Various Gate Voltage

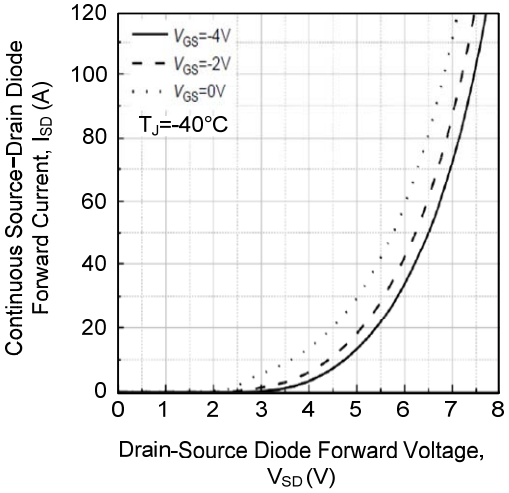


■ TYPICAL CHARACTERISTICS (Cont.)

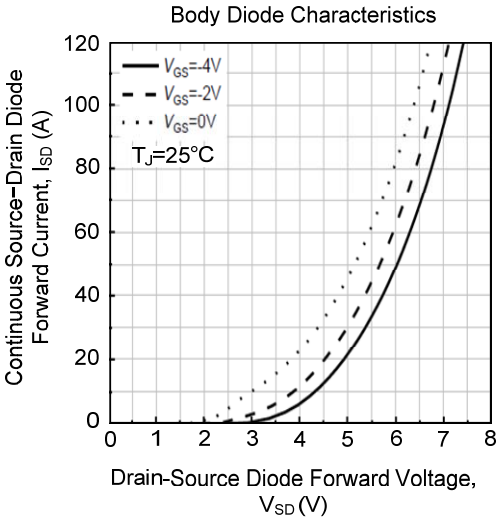
Transfer Characteristic For Various Junction Temperatures



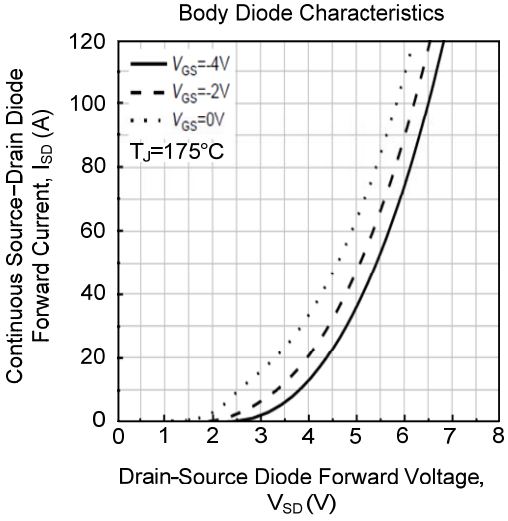
Body Diode Characteristics



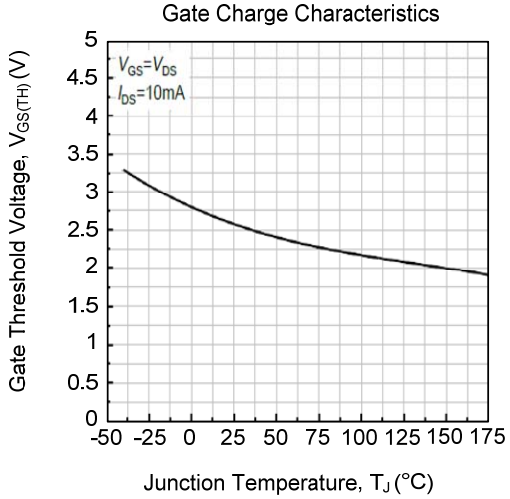
Body Diode Characteristics



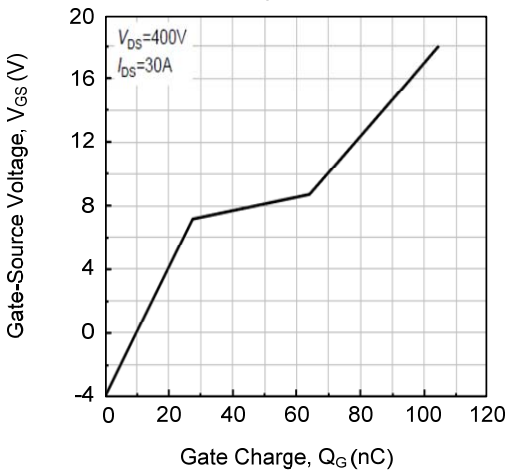
Body Diode Characteristics



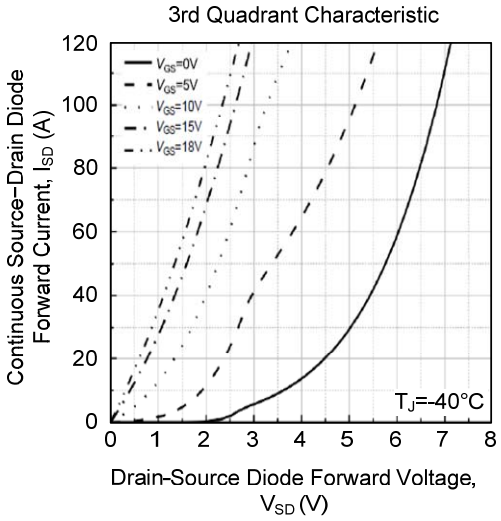
Gate Charge Characteristics

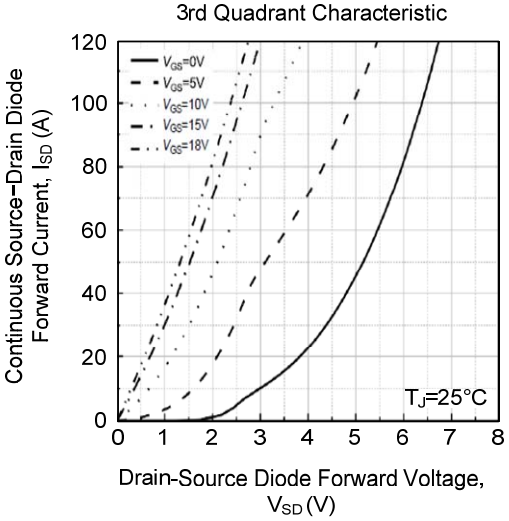


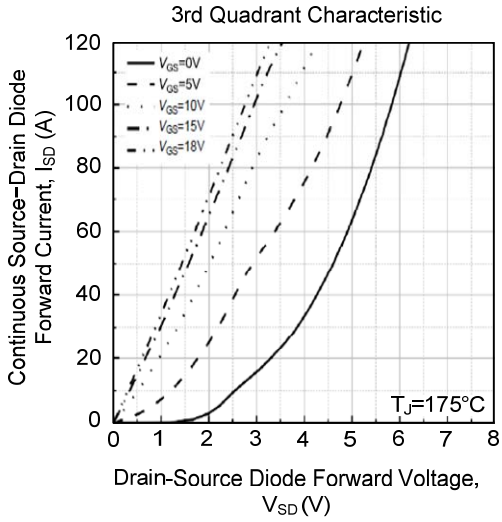
Gate Charge Characteristics

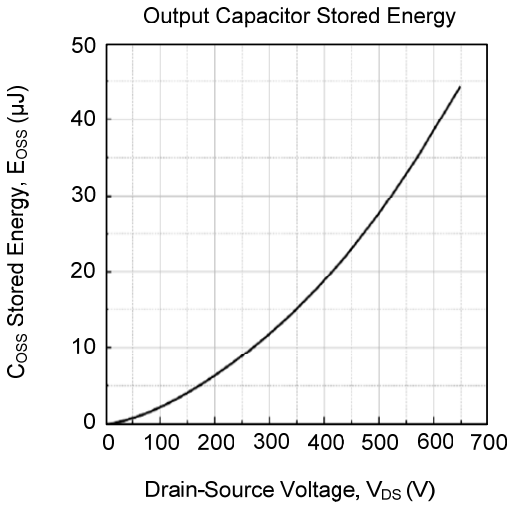


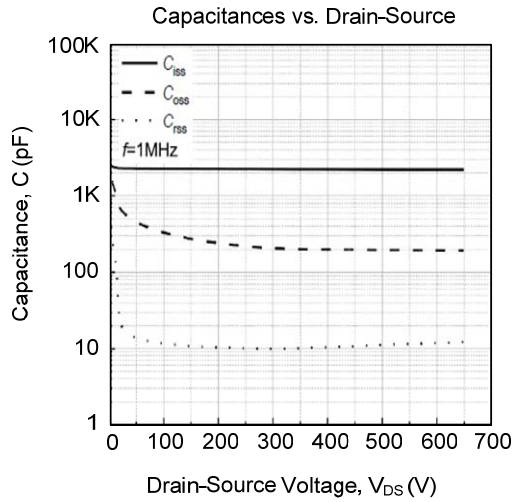
■ TYPICAL CHARACTERISTICS (Cont.)

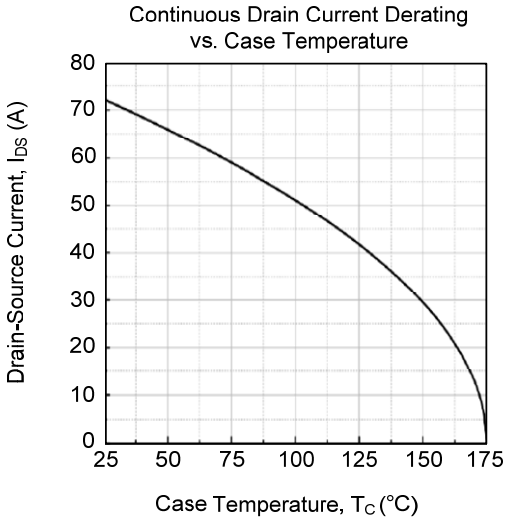






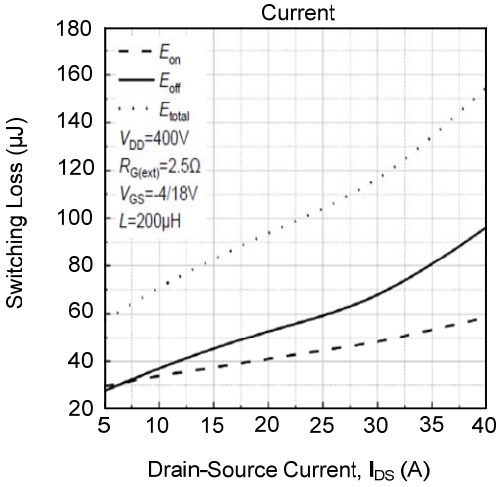




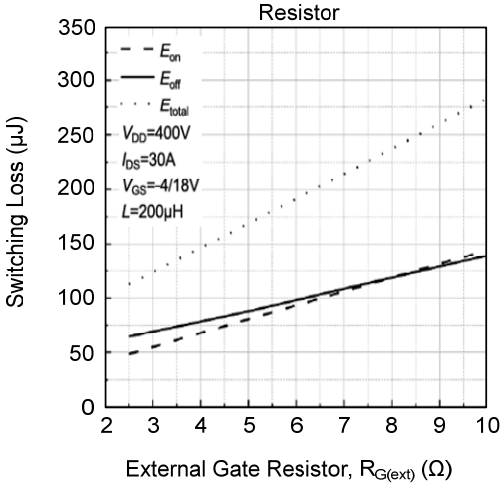


■ TYPICAL CHARACTERISTICS (Cont.)

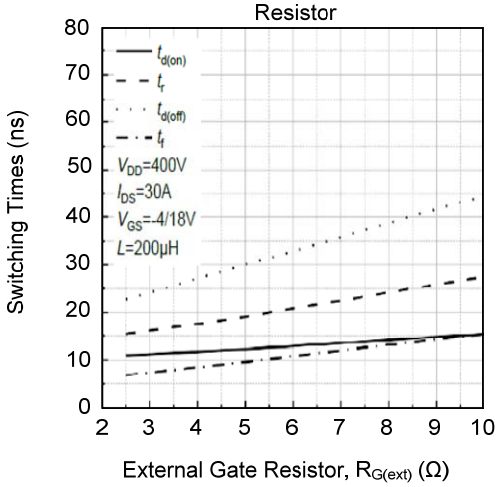
Switching Energy vs. Drain-Source Current



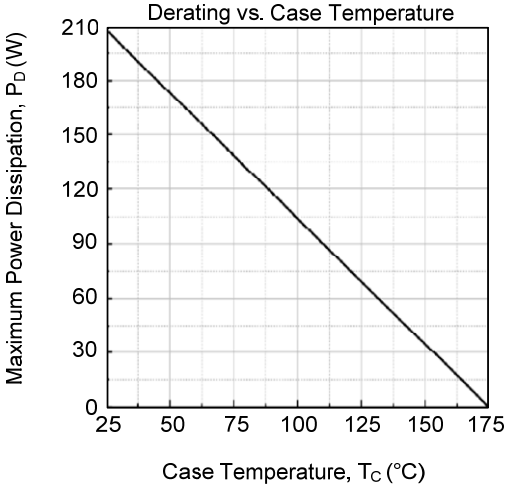
Switching Energy vs. External Gate Resistor



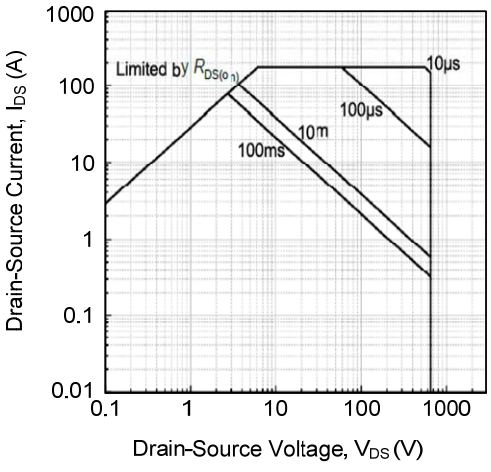
Switching Times vs. External Gate Resistor



Maximum Power Dissipation Derating vs. Case Temperature



Safe Operating Area



Transient Thermal Impedance (Junction to Case)