



USC065R023A

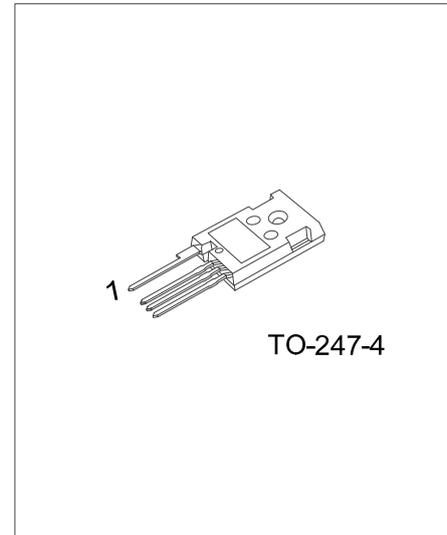
Power MOSFET

111A, 650V N-CHANNEL SILICON CARBIDE PLANAR ENHANCEMENT POWER MOSFET

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.

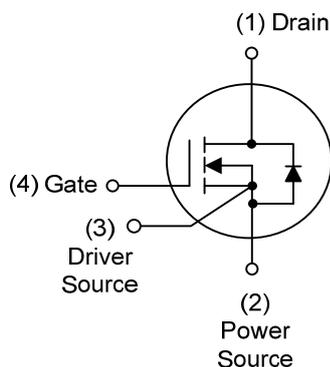
It is widely used in electric vehicle charger, industrial equipment power supply, efficient power regulator inverter and rectification part and other uses.



FEATURES

- * $R_{DS(ON)} \leq 31 \text{ m}\Omega @ V_{GS}=18\text{V}, I_D=33.5\text{A}$
- * 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



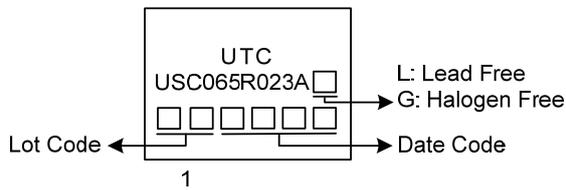
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment				Packing
Lead Free	Halogen Free		1	2	3	4	
USC065R023AL-T474-T	USC065R023AG-T474-T	TO-247-4	D	S	S	G	Tube

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

<p>USC065R023AG-T474-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube (2) T474: TO-247-4 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ 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	
	Max. Transient Voltage		t _p ≤ 0.5μs, D < 0.001	-8 / +22	V
	Static		-4 / +18	V	
Drain Current	Continuous	I _D	V _{GS} =18V T _C =25°C	111	A
			V _{GS} =18V T _C =100°C	79	A
	Pulsed (Note 2)	I _{DM}	230	A	
Power Dissipation		P _D	T _C =25°C	357	W
			T _C =100°C	178	W
Repetitive Avalanche Energy		E _{AR}	627	mJ	
Non-Repetitive Avalanche Switching Energy		E _{AS}	1012	mJ	
Short-Circuit Withstand Time		t _{SC}	2.5	μs	
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.

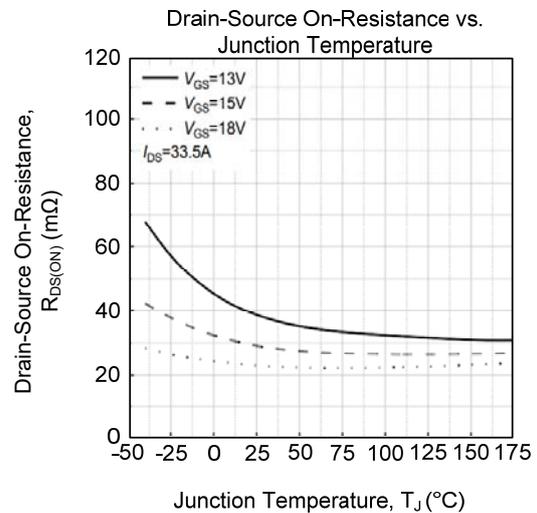
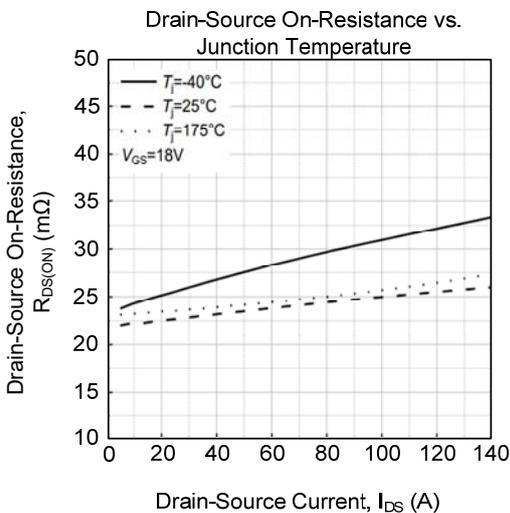
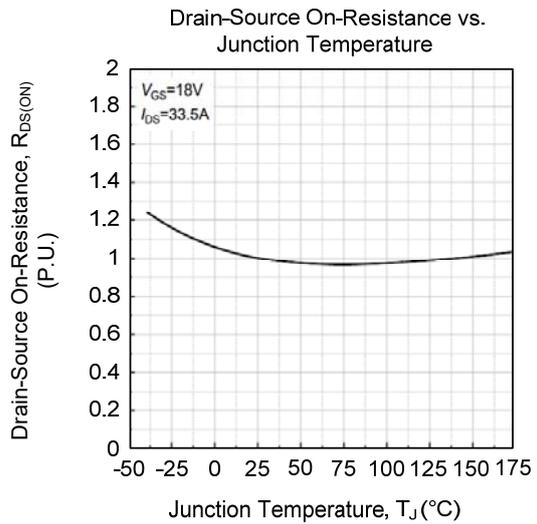
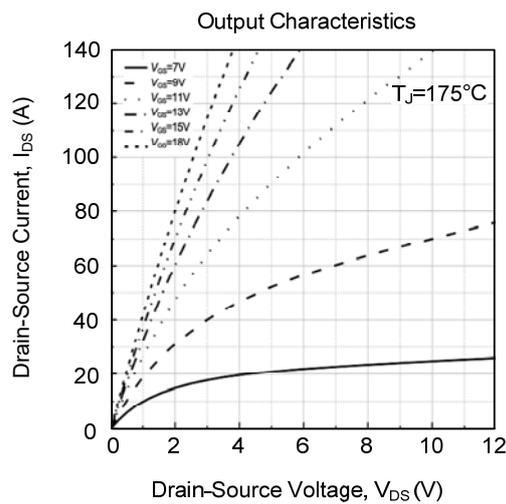
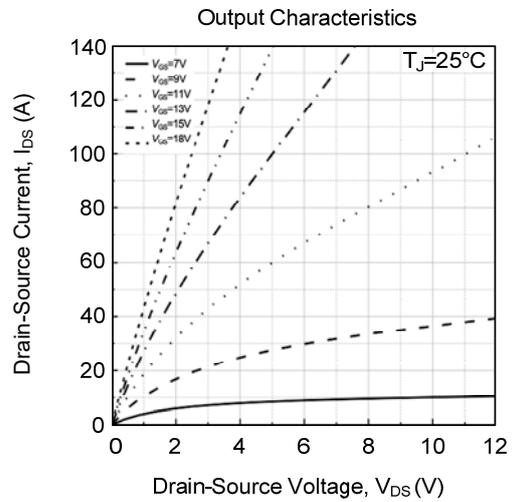
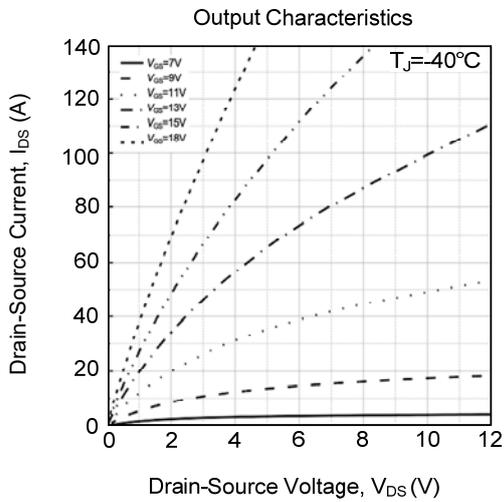
■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ _{JA}	50	°C/W
Junction to Case	θ _{JC}	0.42	°C/W

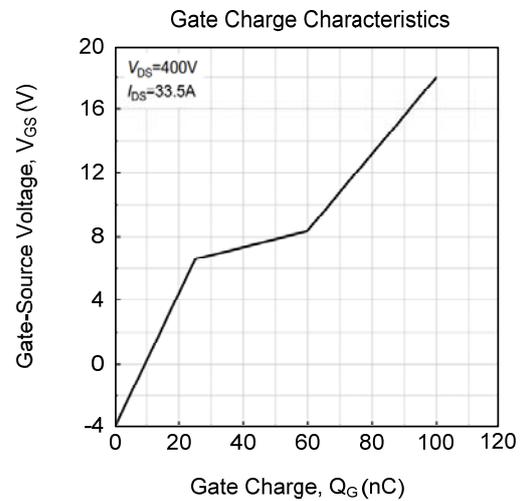
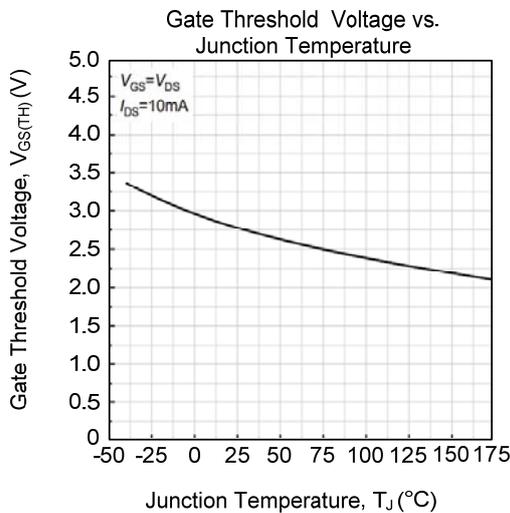
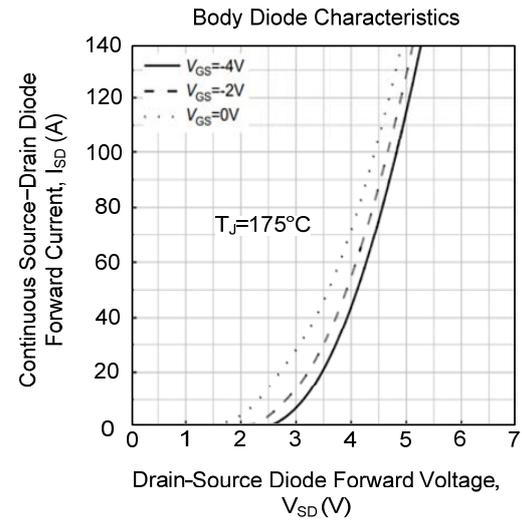
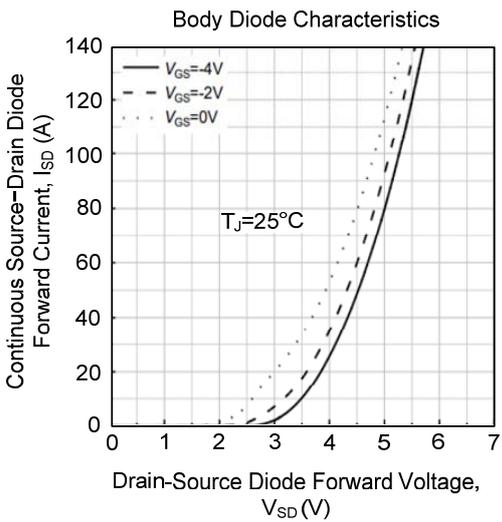
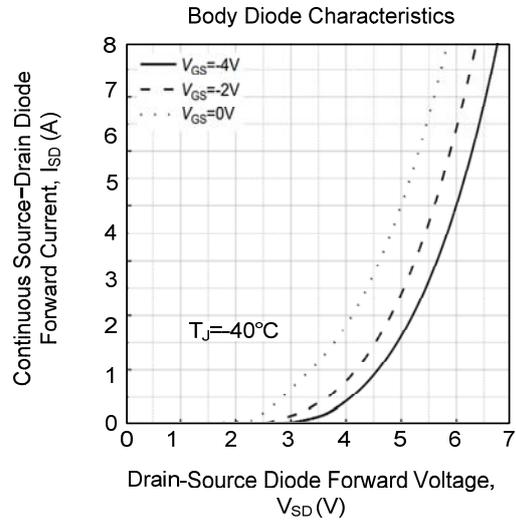
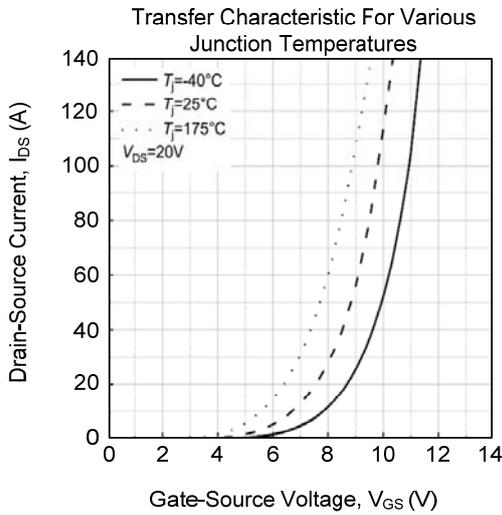
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

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	2.7	4.0	V	
		V _{DS} =V _{GS} , I _D =10mA T _J =175°C		2.0		V	
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =18V, I _D =33.5A		23	31	mΩ	
		V _{GS} =18V, I _D =33.5A, T _J =175°C		25		mΩ	
Forward Transconductance	g _{FS}	V _{DS} =20V, I _D =33.5A		24		S	
DYNAMIC PARAMETERS							
Input Capacitance	C _{ISS}	V _{DS} =600V, V _{GS} =0V, f=100KHz		2162		pF	
Output Capacitance	C _{OSS}			195		pF	
Reverse Transfer Capacitance	C _{RSS}			14		pF	
C _{OSS} Stored Energy	E _{OSS}			40		μJ	
SWITCHING PARAMETERS							
Total Gate Charge	Q _G	V _{DS} =400V, V _{GS} =-4V / +18V, I _D =33.5A		100		nC	
Gate to Source Charge	Q _{GS}			25		nC	
Gate to Drain Charge	Q _{GD}			28		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 =33.5A, R _{G(ext)} =2.5Ω, L=103μH, T _J =25°C		63		μJ	
Turn-off switching energy	E _{OFF}			31		μJ	
Turn-ON Delay Time	t _{D(ON)}			12		ns	
Rise Time	t _r			14		ns	
Turn-OFF Delay Time	t _{D(OFF)}			25		ns	
Fall-Time	t _f			8		ns	
Turn-on switching energy	E _{ON}		V _{DS} =400V, V _{GS} =-4V / +18V, I _D =33.5A, R _{G(ext)} =2.5Ω, L=103μH, T _J =175°C		58		μJ
Turn-off switching energy	E _{OFF}				41		μJ
Turn-ON Delay Time	t _{D(ON)}			11		ns	
Rise Time	t _r			14		ns	
Turn-OFF Delay Time	t _{D(OFF)}			29		ns	
Fall-Time	t _f			9		ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =-4.0V, I _{SD} =16.8A, T _J =25°C		3.8		V	
		V _{GS} =-4.0V, I _{SD} =16.8A, T _J =175°C		3.4		V	
		V _{GS} =-4.0V, I _{SD} =33.5A, T _J =25°C		4.2		V	
		V _{GS} =-4.0V, I _{SD} =33.5A, T _J =175°C		3.9		V	
Continuous Diode Forward Current	I _S	V _{GS} =-4.0V		79		A	
		V _{GS} =-4.0V, T _J =100°C		45		A	
Body Diode Reverse Recovery Time	t _{rr}	V _{GS} =-4.0V, I _{SD} =33.5A, V _R =400V, diF/dt=1862A/μs, T _J =25°C		19		ns	
Body Diode Reverse Recovery Charge	Q _{rr}			230		nC	
Peak Reverse Recovery Current	I _{rrm}			22.2		A	
Body Diode Reverse Recovery Time	t _{rr}	V _{GS} =-4.0V, I _{SD} =33.5A, V _R =400V, diF/dt=1764A/μs, T _J =175°C		22		ns	
Body Diode Reverse Recovery Charge	Q _{rr}			343		nC	
Peak Reverse Recovery Current	I _{rrm}			27.1		A	

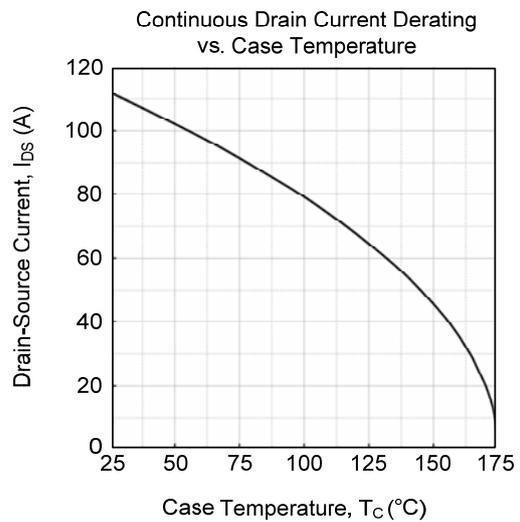
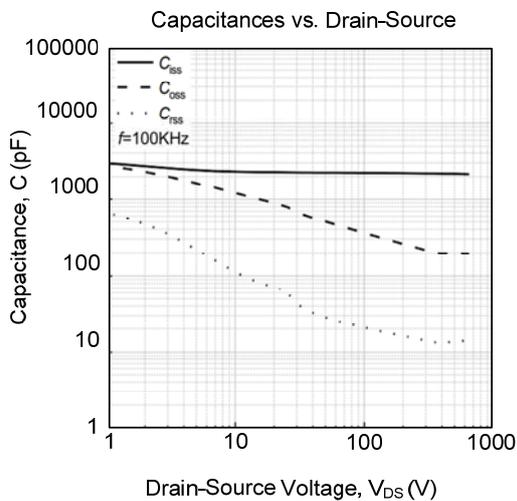
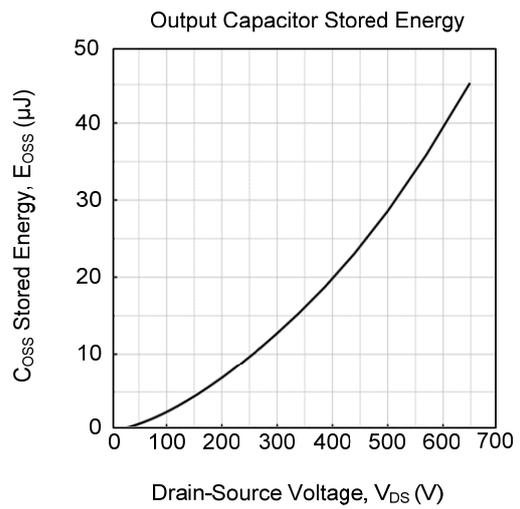
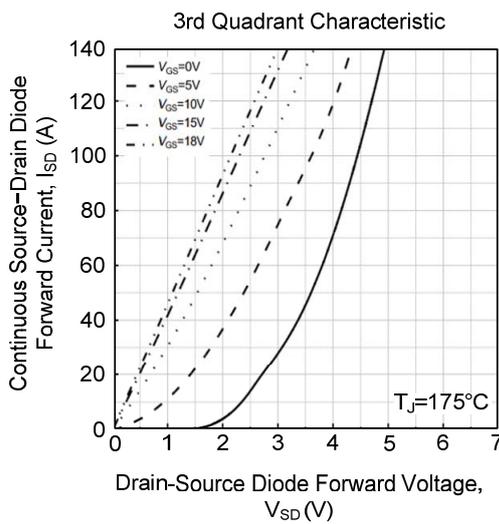
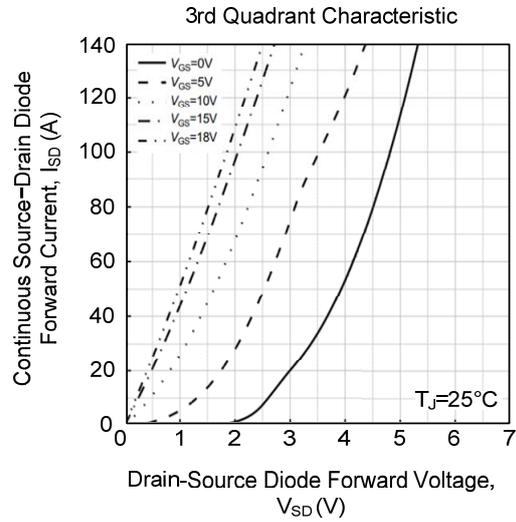
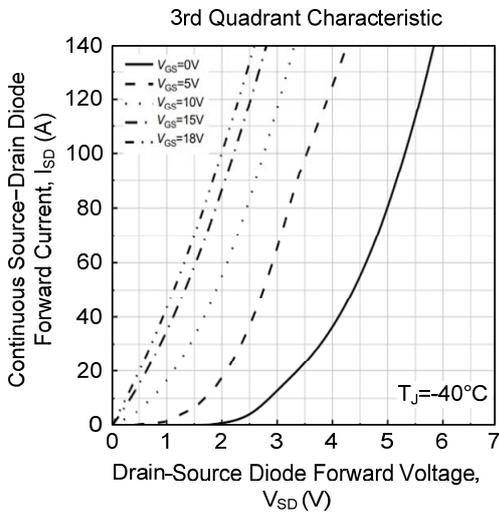
■ TYPICAL CHARACTERISTICS



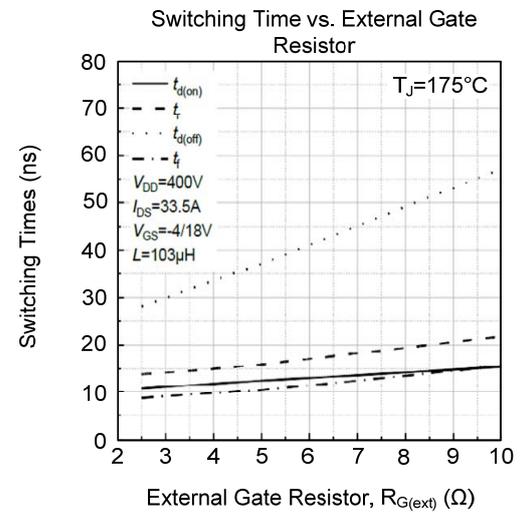
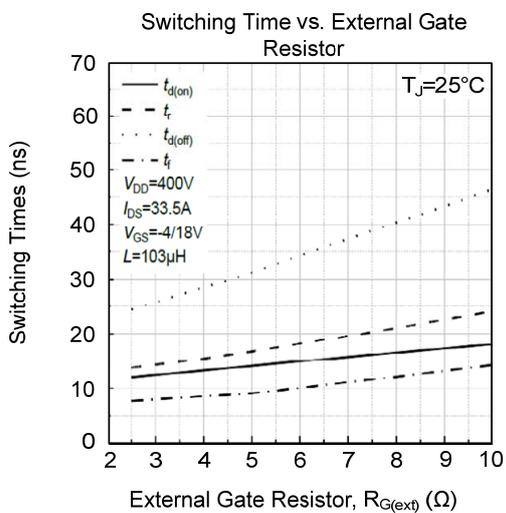
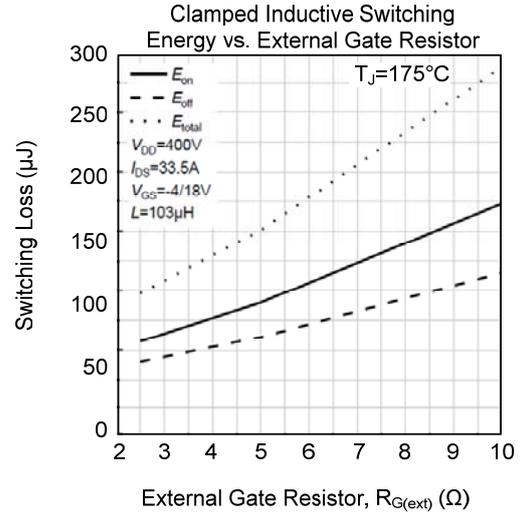
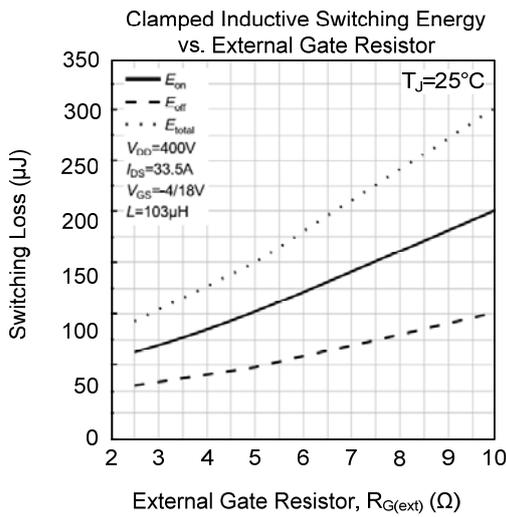
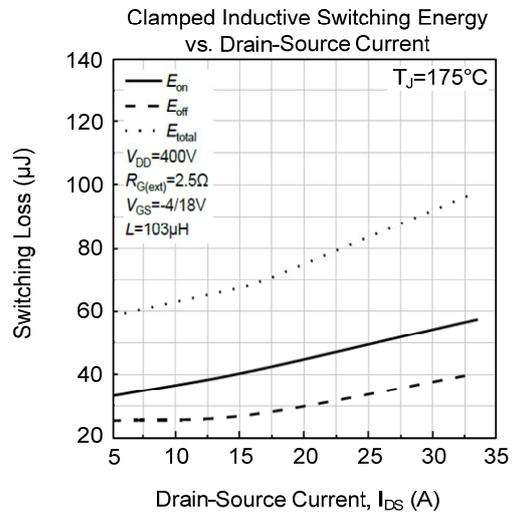
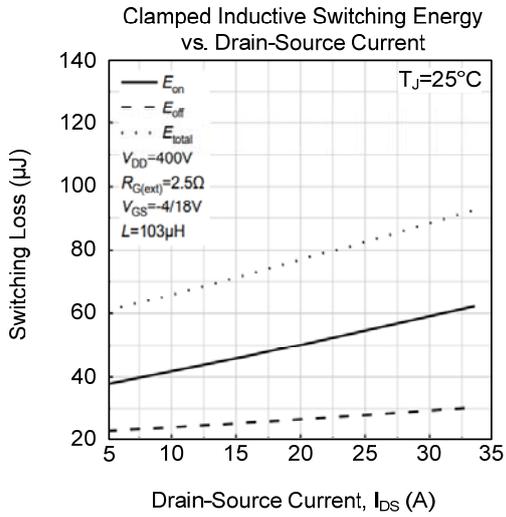
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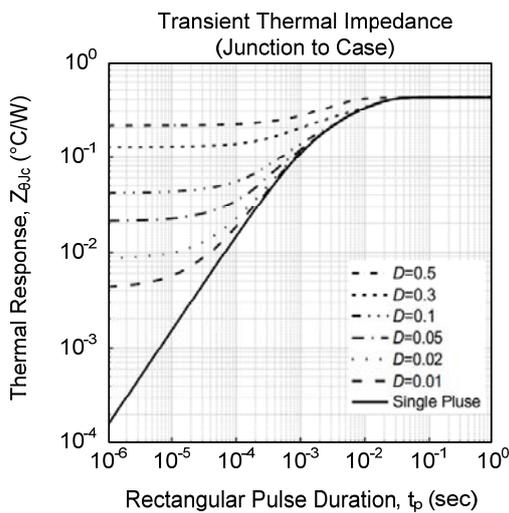
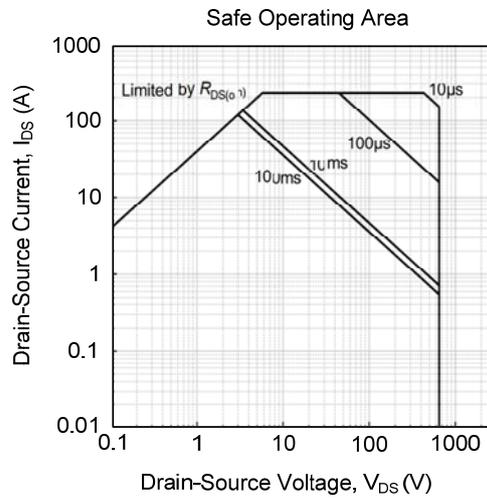
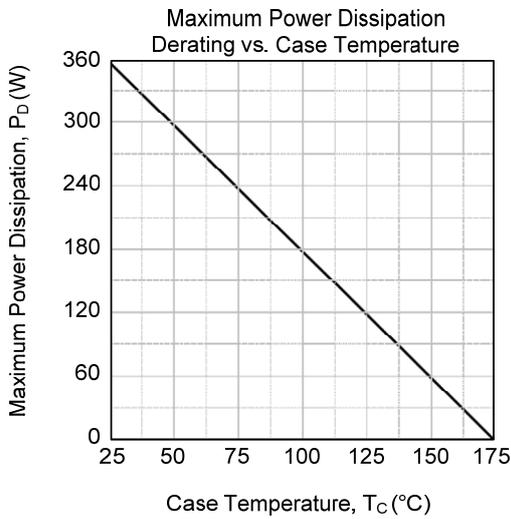
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