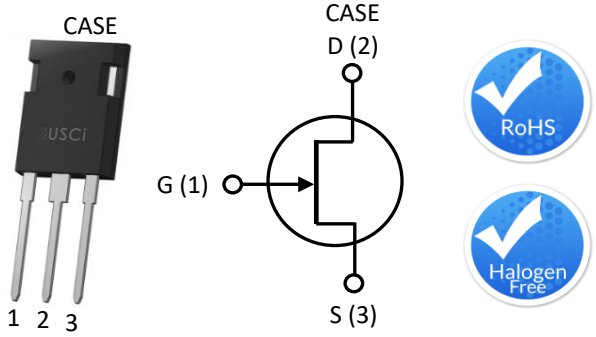
Description

United Silicon Carbide, Inc offers the high-performance G3 SiC normally-on JFET transistors. This series exhibits ultra-low on resistance ($R_{DS(ON)}$) and gate charge (Q_G) allowing for low conduction and switching loss. The device normally-on characteristics with low $R_{DS(ON)}$ at V_{GS} = 0 V is also ideal for current protection circuits without the need for active control, as well as for cascode operation.



Part Number	Package	Marking
UJ3N065080K3S	TO-247-3L	UJ3N065080K3S

Features

- Typical on-resistance $R_{DS(on),typ}$ of 80mΩ
- Voltage controlled
- Maximum operating temperature of 175°C
- Extremely fast switching not dependent on temperature
- Low gate charge
- Low intrinsic capacitance
- RoHS compliant

Typical Applications

- Over current protection circuits
- DC-AC inverters
- Switch mode power supplies
- Power factor correction modules
- Motor drives
- Induction heating

Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Units
Drain-source voltage	V_{DS}		650	V
Gate-source voltage	V_{GS}	DC	-20 to +3	V
		AC (1)	-20 to +20	
Continuous drain current (2)	I_D	T_C = 25°C	32	A
		T_C = 100°C	24	A
Pulsed drain current (3)	I_{DM}	T_C = 25°C	72	A
Power dissipation	P_{tot}	T_C=25°C	190	W
Maximum junction temperature	$T_{J,max}$		175	°C
Operating and storage temperature	T_J, T_{STG}		-55 to 175	°C
Max. lead temperature for soldering, 1/8" from case for 5 seconds	T_L		250	°C

(1) +20V AC rating applies for turn-on pulses <200ns applied with external R_G > 1Ω.
(2) Limited by $T_{J,max}$
(3) Pulse width t_p limited by $T_{J,max}$

Electrical Characteristics (T_J = +25°C unless otherwise specified)

Typical Performance - Static

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Drain-source breakdown voltage	BV_{DS}	V_{GS}= - 20V, I_D=1mA	650			V
Total drain leakage current	I_D	V_{DS} = 650V, V_{GS} = -20V, T_J = 25°C		8	60	µA
		V_{DS} = 650V, V_{GS} = -20V, T_J = 175°C		30		
Total gate leakage current	I_G	V_{GS}=-20V, T_j=25°C		10	50	µA
		V_{GS}=-20V, T_j=175°C		32		
Drain-source on-resistance	$R_{DS(on)}$	V_{GS}=2V, I_D=10A, T_J = 25°C		68		mΩ
		V_{GS}=0V, I_D=10A, T_J = 25°C		80	95	
		V_{GS}=2V, I_D=10A, T_J = 175°C		114		
		V_{GS}=0V, I_D=10A, T_J = 175°C		130		
Gate threshold voltage	$V_{G(th)}$	V_{DS} = 5V, I_D = 20mA	-14	-11.5	-6	V
Gate resistance	R_G	f = 1MHz, open drain		3.7		Ω

Typical Performance - Dynamic

Parameter	symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Input capacitance	C_{iss}	V_{DS} = 100V, V_{GS} = -20V, f = 100kHz		630		pF
Output capacitance	C_{oss}			94		
Reverse transfer capacitance	C_{rss}			88		
Effective output capacitance, energy related	$C_{oss(er)}$	V_{DS} = 0V to 400V, V_{GS} = -20V		69		pF
Total gate charge	Q_G	V_{DS}=400V, I_D = 24A, V_{GS}=-18V to 0V		75		nC
Gate-drain charge	Q_{GD}			43		
Gate-source charge	Q_{GS}			7		
Turn-on delay time	$t_{d(on)}$	V_{DS}=400V, I_D=24A, Gate Driver =-18V to 0V, $R_{G,EXT}$ = 1Ω, Inductive Load, FWD: UJ3D06510TS T_J = 25°C		6		ns
Rise time	t_r			25		
Turn-off delay time	$t_{d(off)}$			14		
Fall time	t_f			31		
Turn-on energy	E_{ON}			149		µJ
Turn-off energy	E_{OFF}			183		
Total switching energy	E_{TOTAL}			332		
Turn-on delay time	$t_{d(on)}$	V_{DS}=400V, I_D=24A, Gate Driver =-18V to 0V, $R_{G,EXT}$ = 1Ω, Inductive Load, FWD: UJ3D06510TS T_J = 150°C		6		ns
Rise time	t_r			24		
Turn-off delay time	$t_{d(off)}$			14		
Fall time	t_f			14		
Turn-on energy	E_{ON}			134		µJ
Turn-off energy	E_{OFF}			103		
Total switching energy	E_{TOTAL}			237		

Thermal Characteristics

Parameter	symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal resistance, junction-to-case	$R_{\theta JC}$			0.61	0.79	°C/W

Typical Performance Diagrams

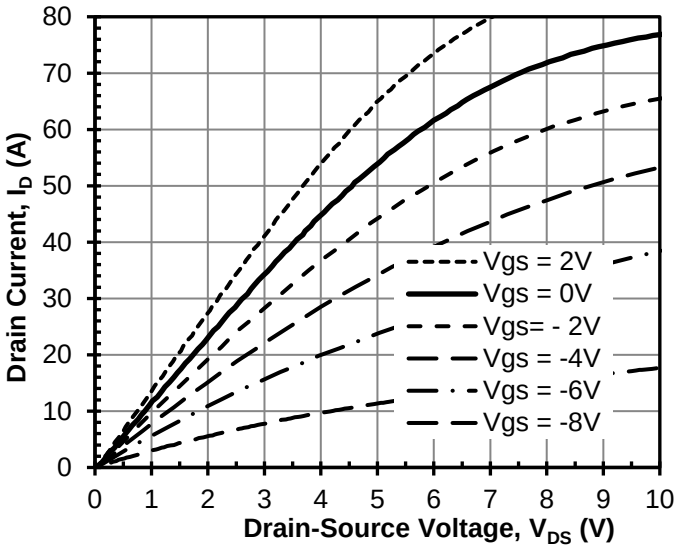


Figure 1 Typical output characteristics at T_J = 55°C

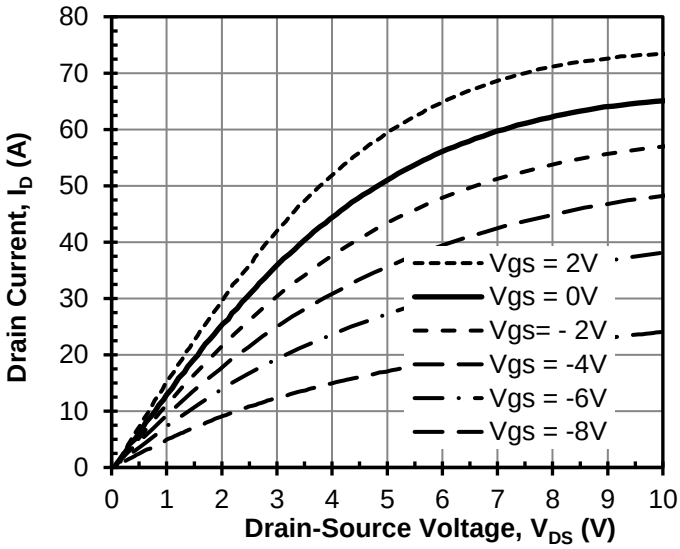


Figure 2 Typical output characteristics at T_J = 25°C

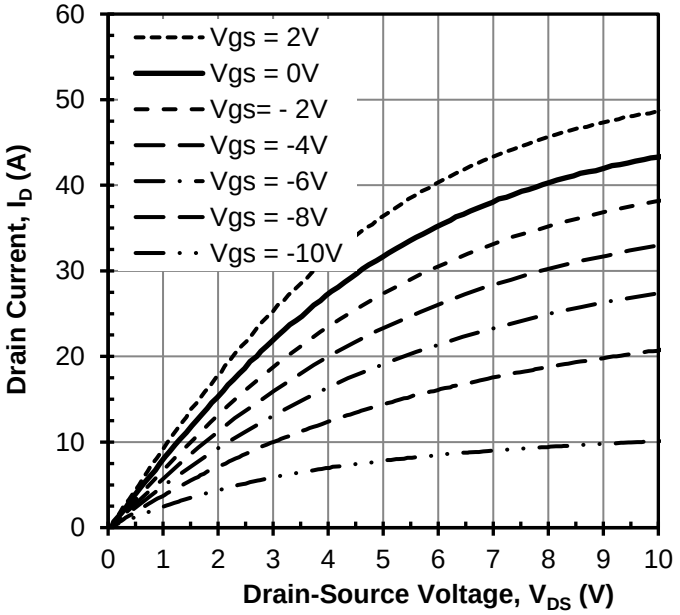


Figure 3 Typical output characteristics at T_J = 175°C

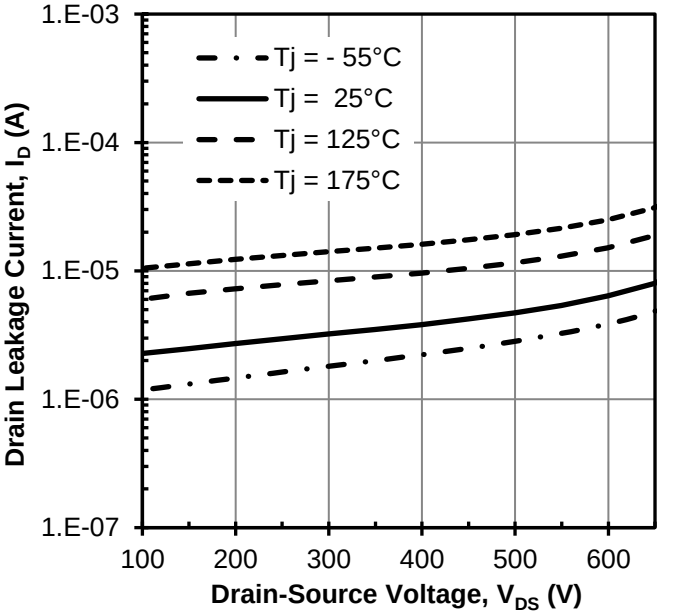


Figure 4 Typical drain-source leakage at V_{GS} = -20V

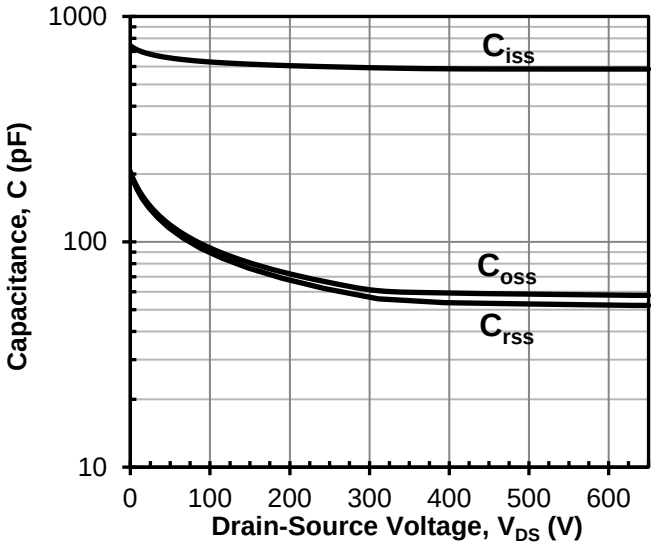


Figure 5 Typical capacitances at 100kHz and V_{GS} = -20V

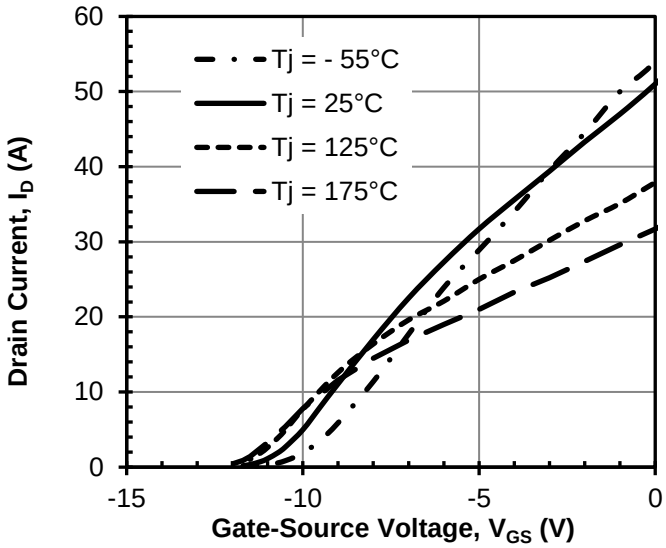


Figure 6 Typical transfer characteristics at V_{DS} = 5V

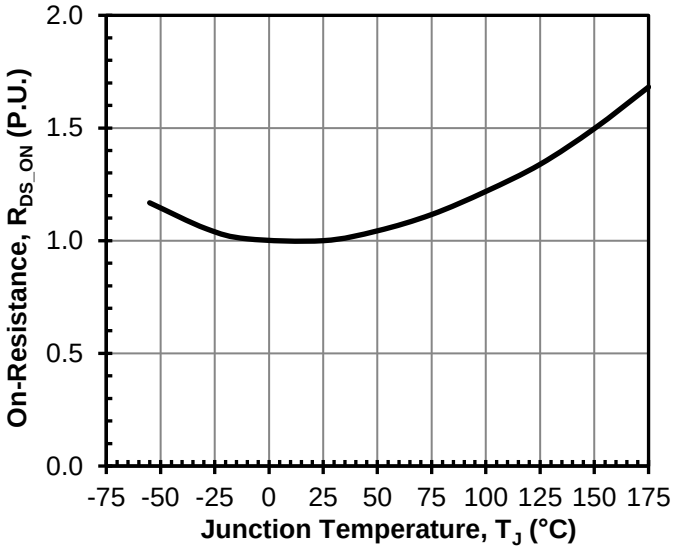


Figure 7 Normalized on-resistance vs. temperature at V_{GS} = 0V and I_D = 10A

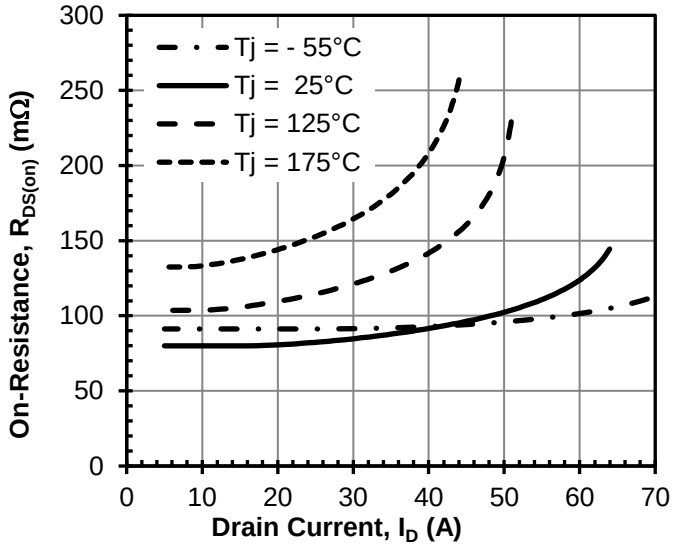


Figure 8 Typical drain-source on-resistance at V_{GS} = 0V

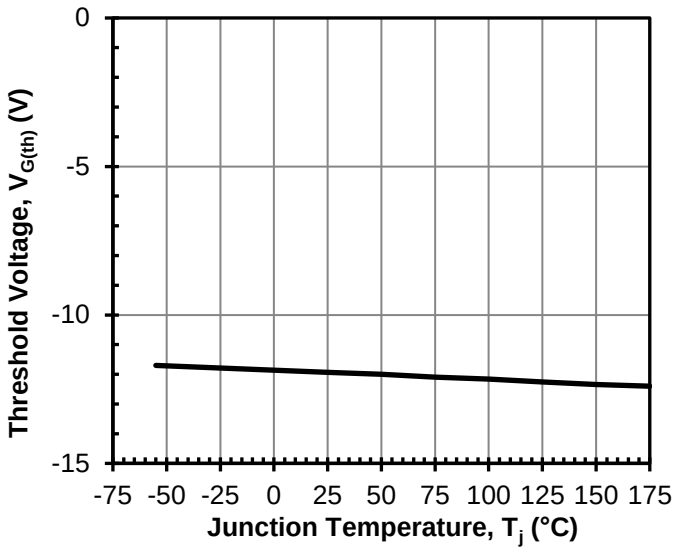


Figure 9 Threshold voltage vs. Tj at V_{DS} = 5V and I_D = 20mA

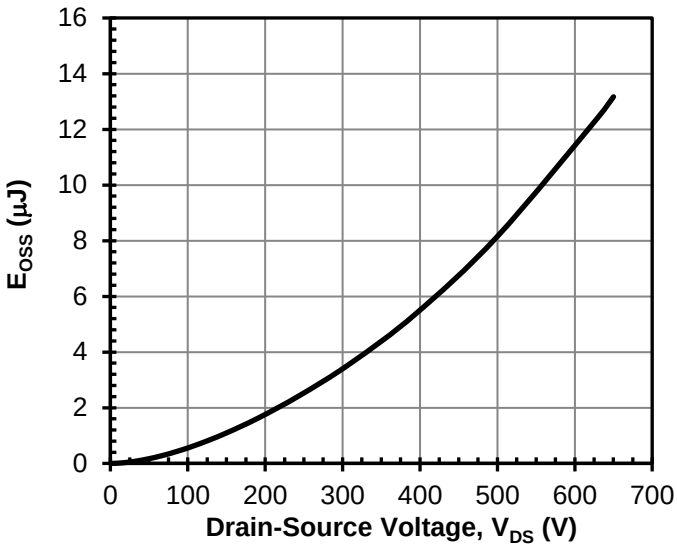


Figure 10 Typical stored energy in C_{OSS} at V_{GS} = -20V

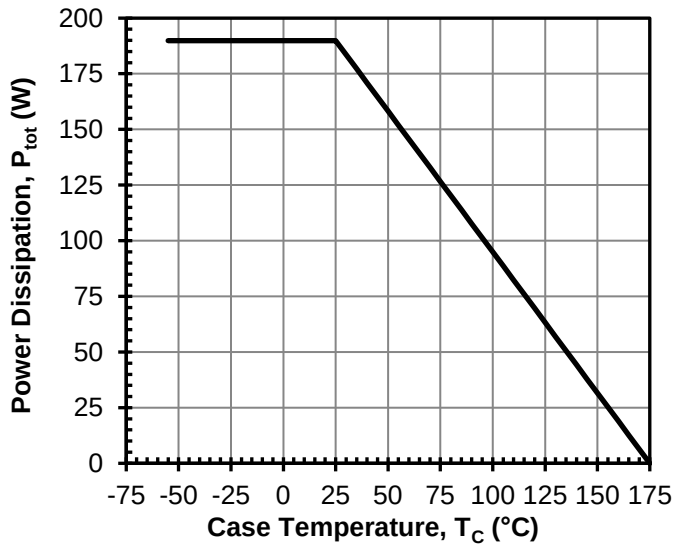


Figure 11 Total power Dissipation

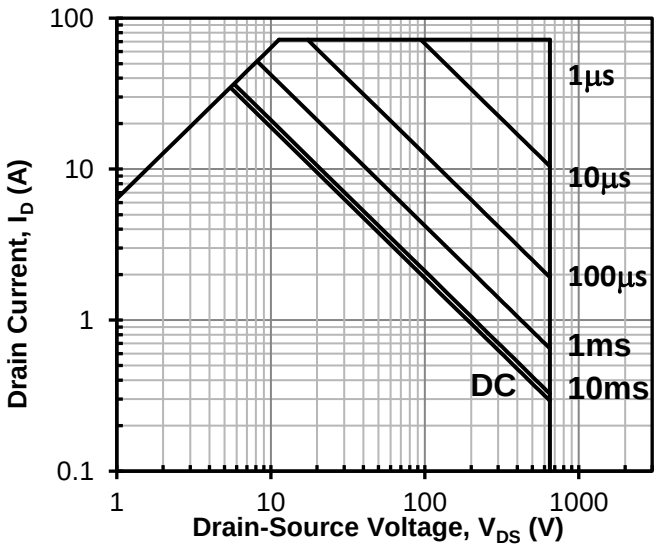


Figure 12 Safe operation area T_c = 25°C, Parameter t_p

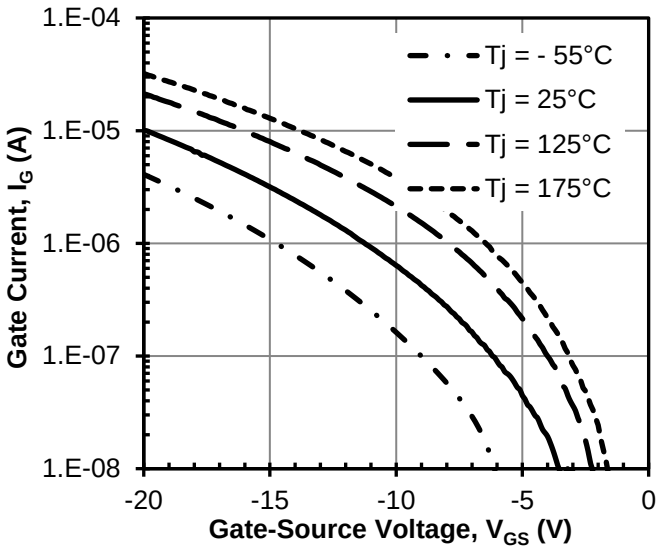


Figure 13 Typical gate leakage current at V_{DS} = 0V

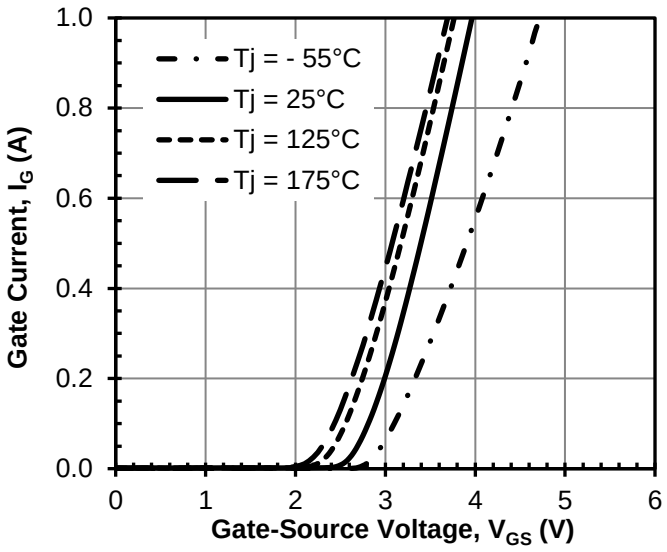


Figure 14 Typical gate forward current at V_{DS} = 0V

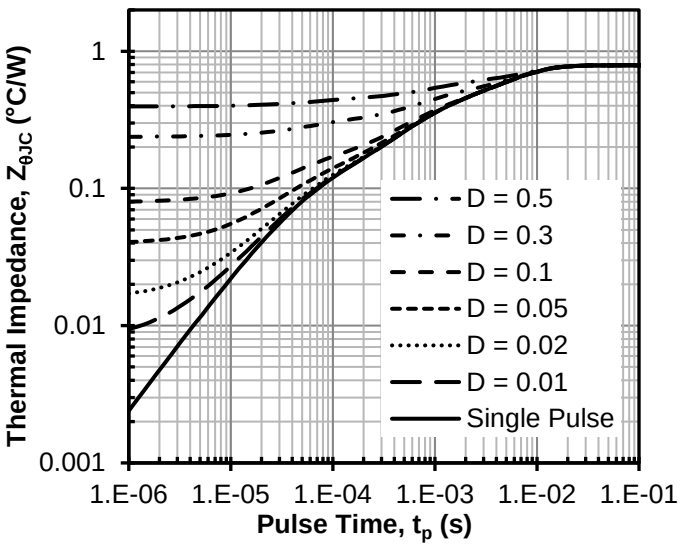


Figure 15 Maximum transient thermal impedance

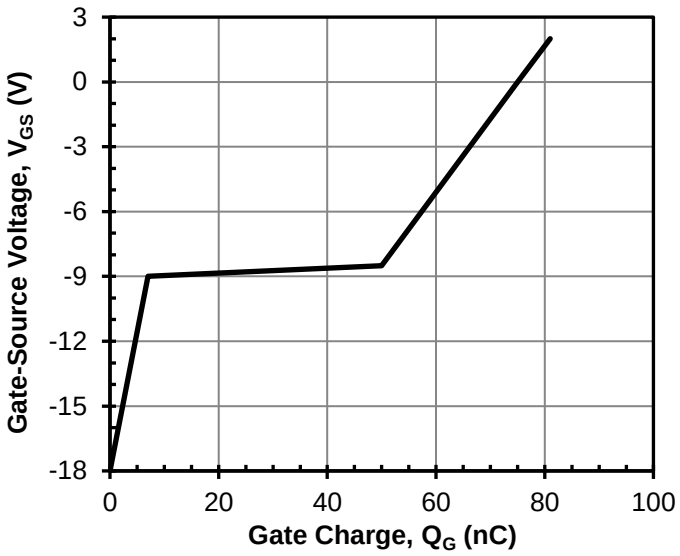


Figure 16 Typical gate charge at V_{DS} = 400V and I_D = 24A

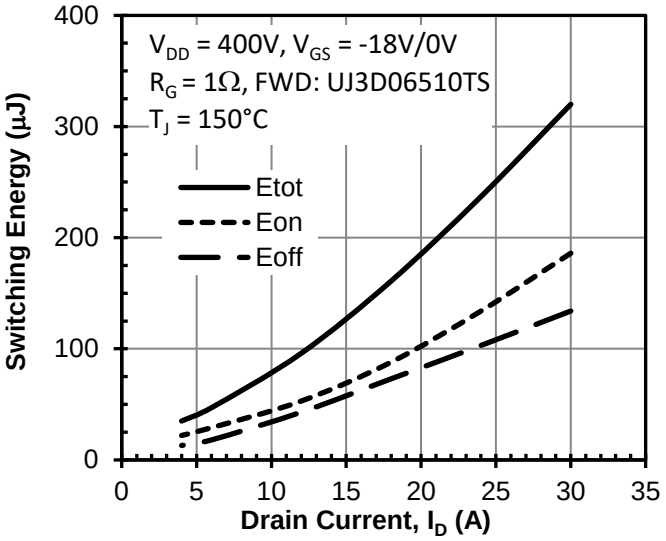


Figure 17 Clamped inductive switching energy vs. drain current at T_J = 150°C

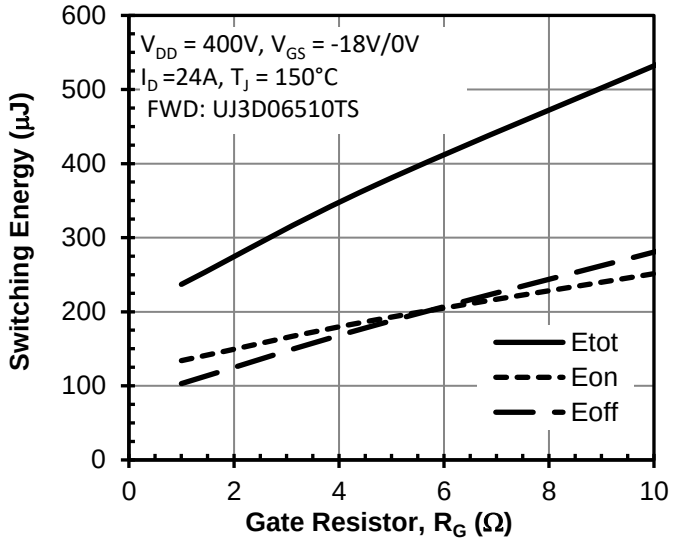


Figure 18 Clamped inductive switching energy vs. gate resistor R_G

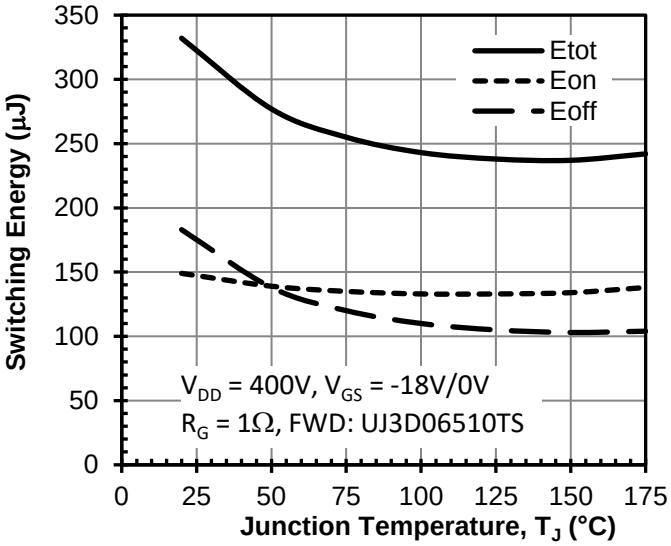


Figure 19 Clamped inductive switching energy vs. junction temperature at I_D = 24A

Disclaimer

United Silicon Carbide, Inc. reserves the right to change or modify any of the products and their inherent physical and technical specifications without prior notice. United Silicon Carbide, Inc. assumes no responsibility or liability for any errors or inaccuracies within.

Information on all products and contained herein is intended for description only. No license, express or implied, to any intellectual property rights is granted within this document.

United Silicon Carbide, Inc. assumes no liability whatsoever relating to the choice, selection or use of the United Silicon Carbide, Inc. products and services described herein.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Qorvo:

UJ3N065080K3S