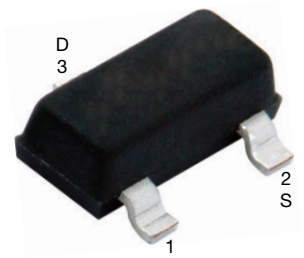
P-Channel 80 V (D-S) MOSFET

SOT-23 (TO-236)



Top View

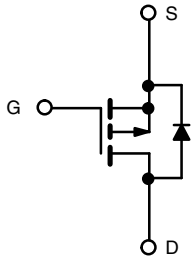
Marking code: G8

FEATURES

- TrenchFET® Gen IV p-channel power MOSFET
- 100 % R_g and UIS tested

APPLICATIONS

- Load switch
- Circuit protection
- Motor drive control



P-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	-80
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.164
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.242
Q_g typ. (nC)	6.7
I_D (A) [a, e]	-3.0
Configuration	Single

ORDERING INFORMATION	
Package	SOT-23
Lead (Pb)-free and halogen-free	SI2387DS-T1-GE3

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	-80	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current (T_J = 150 °C)	T_C = 25 °C	I_D	-3.0 [e]	A
	T_C = 70 °C		-2.4	
	T_A = 25 °C		-2.1 [b, c]	
	T_A = 70 °C		-1.7 [b, c]	
Pulsed drain current (t = 100 µs)		I_{DM}	-10	
Continuous source-drain diode current	T_C = 25 °C	I_S	-2.1	
	T_A = 25 °C		-1.1 [b, c]	
Maximum power dissipation	T_C = 25 °C	P_D	2.5	W
	T_C = 70 °C		1.6	
	T_A = 25 °C		1.3 [b, c]	
	T_A = 70 °C		0.8 [b, c]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient [b]	t ≤ 5 s	R_{thJA}	75	100	°C/W
Maximum junction-to-case (drain)	Steady5 state	R_{thJF}	40	50	

Notes

a. Based on T_C = 25 °C
b. Surface mounted on 1" x 1" FR4 board
c. t = 5 s
d. Maximum under steady state conditions is 166 °C/W
e. Package limited

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = -250 µA	-80	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	I_D = -250 µA	-	-24.7	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$	I_D = -250 µA	-	4.7	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	-1.5	-	-2.5	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20	-	-	100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = -80 V, V_{GS} = 0 V	-	-	-1	µA
		V_{DS} = -80 V, V_{GS} = 0 V, T_J = 70 °C	-	-	-15	
On-state drain current [a]	$I_{D(on)}$	$V_{DS} \geq$ -10 V, V_{GS} = -10 V	-10	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = -10 V, I_D = -2.1 A	-	0.137	0.164	Ω
		V_{GS} = -4.5 V, I_D = -1.7 A	-	0.202	0.242	
Forward transconductance [a]	g_{fs}	V_{DS} = -15 V, I_D = -2.1 A	-	5	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = -40 V, V_{GS} = 0 V, f = 1 MHz	-	395	-	pF
Output capacitance	C_{oss}		-	155	-	
Reverse transfer capacitance	C_{rss}		-	7	-	
Total gate charge	Q_g	V_{DS} = -40 V, V_{GS} = -10 V, I_D = -2.1 A	-	6.8	10.2	nC
		V_{DS} = -40 V, V_{GS} = -4.5 V, I_D =2.1 A	-	3.2	4.8	
Gate-source charge	Q_{gs}		-	1.8	-	
Gate-drain charge	Q_{gd}		-	0.85	-	
Gate resistance	R_g	f = 1 MHz	0.1	5.5	11	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = -40 V, R_L = 23.5 Ω, $I_D \cong$ -1.7 A, V_{GEN} = -10 V, R_g = 1 Ω	-	12	24	ns
Rise time	t_r		-	5	10	
Turn-off delay time	$t_{d(off)}$		-	22	44	
Fall time	t_f		-	13	26	
Turn-on delay time	$t_{d(on)}$	V_{DD} = -40 V, R_L = 23.5 Ω, $I_D \cong$ -1.7 A, V_{GEN} = -4.5 V, R_g = 1 Ω	-	25	50	
Rise time	t_r		-	20	40	
Turn-off delay time	$t_{d(off)}$		-	22	44	
Fall time	t_f		-	15	30	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	-2.1	A
Pulse diode forward current	I_{SM}		-	-	-10	
Body diode voltage	V_{SD}	I_S = -1.7 A, V_{GS} = 0 V	-	-0.8	-1.2	V
Body diode reverse recovery time	t_{rr}	I_F = -4.8 A, di/dt = 100 A/µs, T_J = 25 °C	-	18	36	ns
Body diode reverse recovery charge	Q_{rr}		-	15	30	nC
Reverse recovery fall time	t_a		-	13	-	ns
Reverse recovery rise time	t_b		-	5	-	

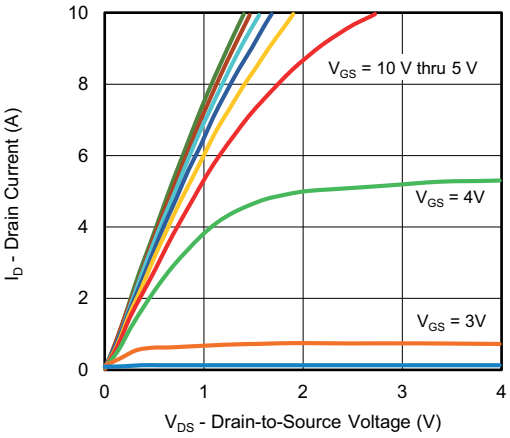
Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

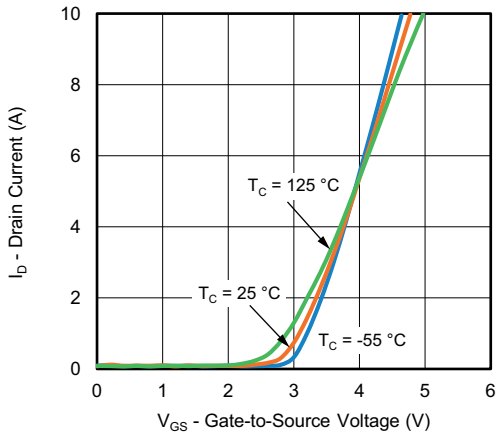
b. Guaranteed by design, not subject to production testing

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

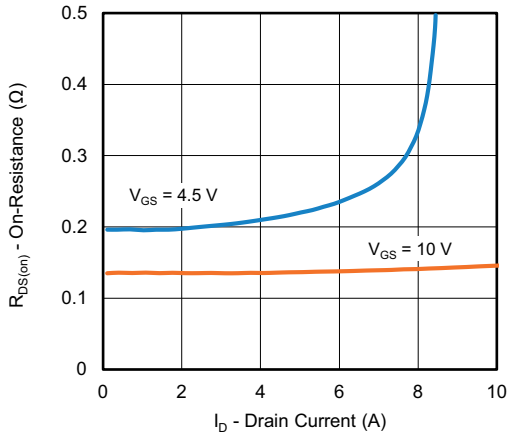
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



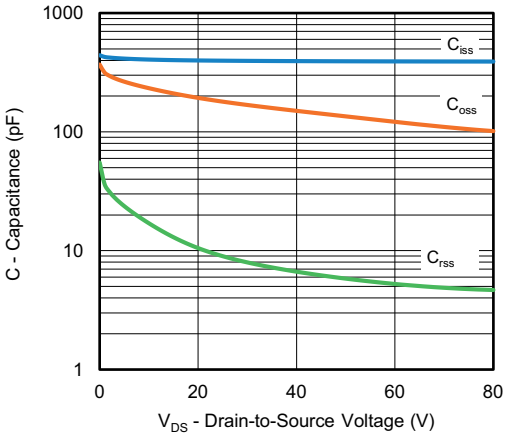
Output Characteristics



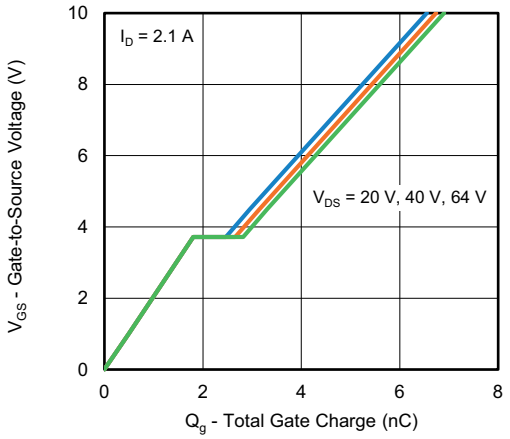
Transfer Characteristics



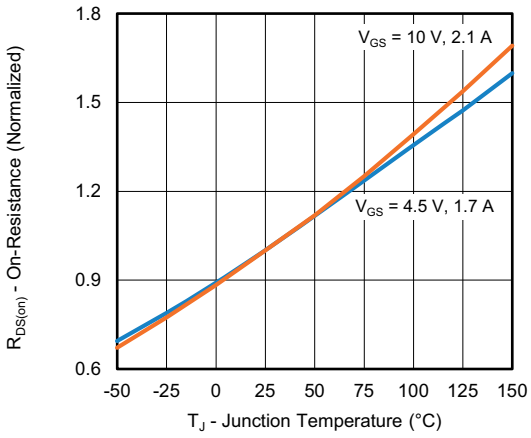
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

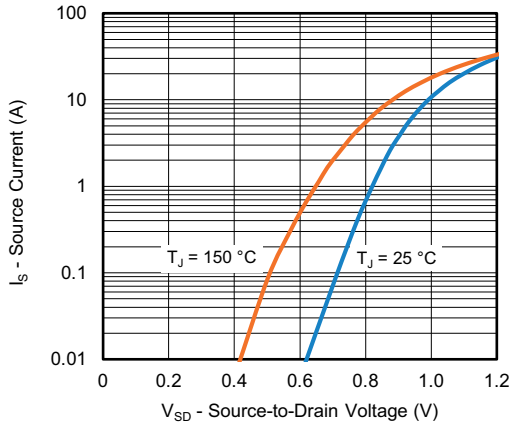


Gate Charge

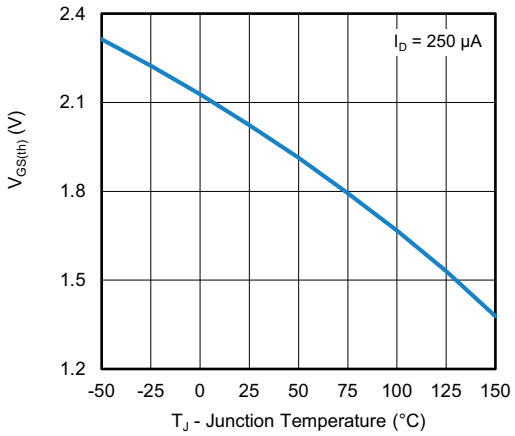


On-Resistance vs. Junction Temperature

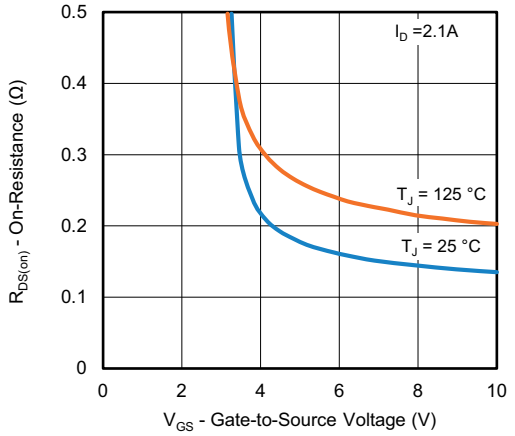
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



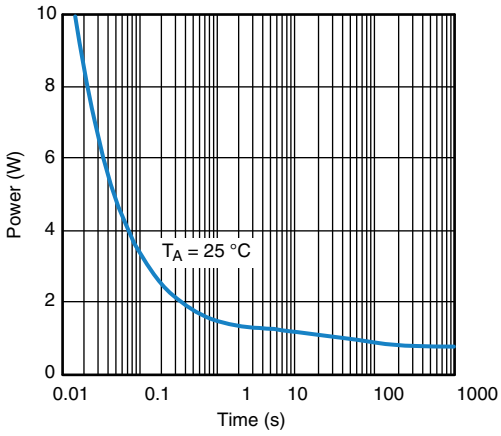
Source-Drain Diode Forward Voltage



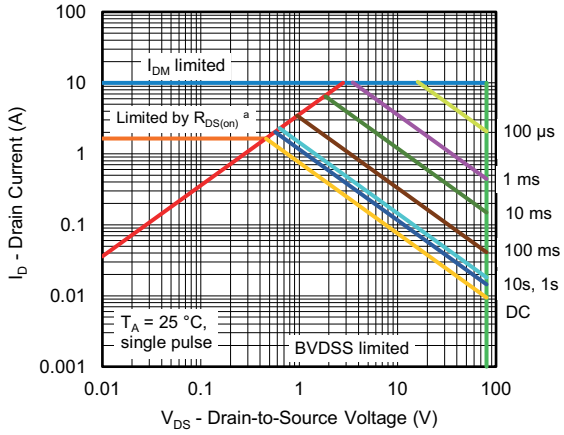
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power, Junction-to-Ambient

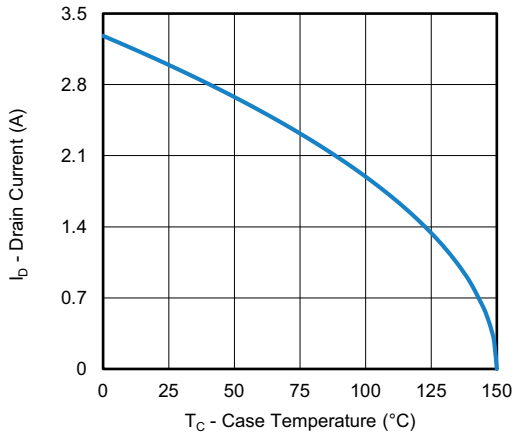


Safe Operating Area, Junction-to-Ambient

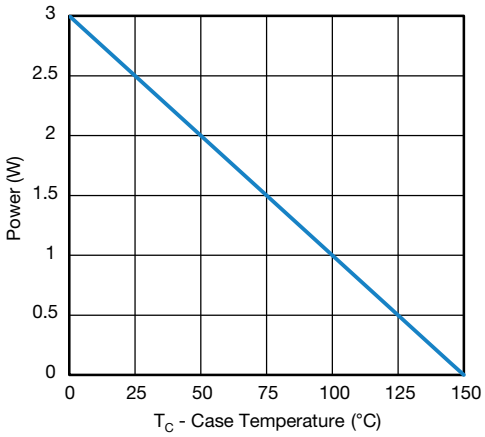
Note

a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]

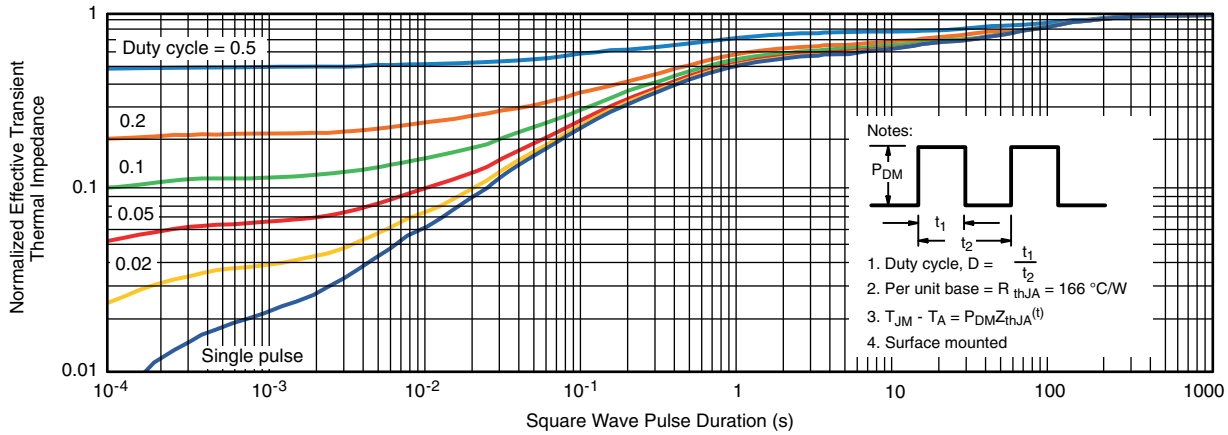


Power, Junction-to-Case

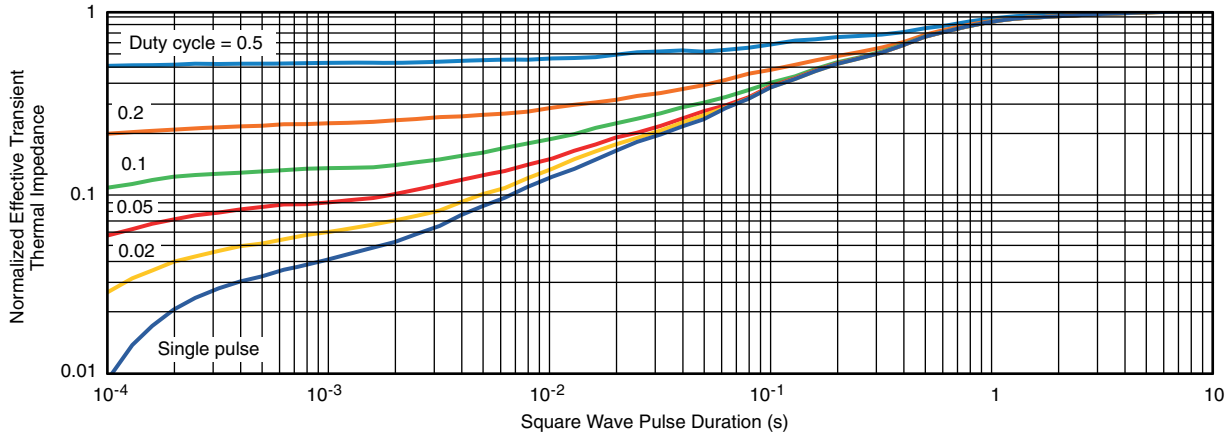
Note

a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case