

Automotive P-Channel 40 V (D-S) 150 °C MOSFET

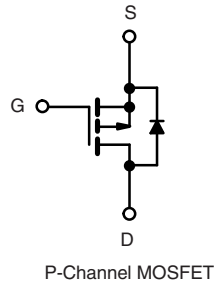
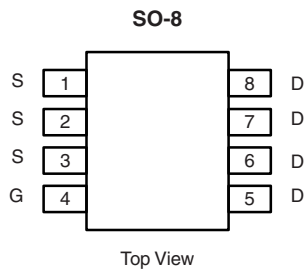
 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY	
V_{DS} (V)	- 40
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.014
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.023
I_D (A)	- 15.8
Configuration	Single

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- AEC-Q101 Qualified
- 100 % R_G and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free and Halogen-free	SQ4401DY-T1-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	- 40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ^a	$T_C = 25$ °C	I_D	- 15.8	A
	$T_C = 125$ °C		- 7.1	
Continuous Source Current (Diode Conduction) ^a		I_S	- 6.5	
Pulsed Drain Current ^b		I_{DM}	- 63	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	- 30	
Single Pulse Avalanche Energy		E_{AS}	45	
Maximum Power Dissipation ^b	$T_C = 25$ °C	P_D	6	W
	$T_C = 125$ °C		1.2	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 150	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount ^c	R_{thJA}	85	°C/W
Junction-to-Foot (Drain)		R_{thJF}	21	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).



SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0, I _D = - 250 μA		- 40	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA		- 1.5	-	- 2.5	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = - 40 V	-	-	- 1.0	μA
		V _{GS} = 0 V	V _{DS} = - 40 V, T _J = 125 °C	-	-	- 50	
		V _{GS} = 0 V	V _{DS} = - 40 V, T _J = 150 °C	-	-	- 120	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = - 10 V	V _{DS} ≥ - 5 V	- 30	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V	I _D = - 10.5 A	-	0.011	0.014	Ω
		V _{GS} = - 10 V	I _D = - 30 A, T _J = 125 °C	-	0.017	0.020	
		V _{GS} = - 10 V	I _D = - 30 A, T _J = 150 °C	-	0.019	0.022	
		V _{GS} = - 4.5 V	I _D = - 30 A	-	0.017	0.023	
Forward Transconductance ^b	g _{fs}	V _{DS} = - 15 V, I _D = - 10.5 A		-	30	-	S
Dynamic^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = - 20 V, f = 1 MHz	-	3400	4250	pF
Output Capacitance	C _{oss}			-	440	550	
Reverse Transfer Capacitance	C _{rss}			-	350	436	
Total Gate Charge ^c	Q _g	V _{GS} = - 10 V	V _{DS} = - 20 V, I _D = - 10.5 A	-	74	115	nC
Gate-Source Charge ^c	Q _{gs}			-	11	-	
Gate-Drain Charge ^c	Q _{gd}			-	16	-	
Gate Resistance	R _g	f = 1 MHz		1.16	-	3.21	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 15 V, R _L = 15 Ω I _D ≅ - 1 A, V _{GEN} = - 10 V, R _g = 6 Ω		-	58	85	ns
Rise Time ^c	t _r			-	76	105	
Turn-Off Delay Time ^c	t _{d(off)}			-	67	85	
Fall Time ^c	t _f			-	44	55	
Source-Drain Diode Ratings and Characteristics^b							
Pulsed Current ^a	I _{SM}			-	-	- 63	A
Forward Voltage	V _{SD}	I _F = - 2.7 A, V _{GS} = 0		-	- 0.8	- 1.1	V

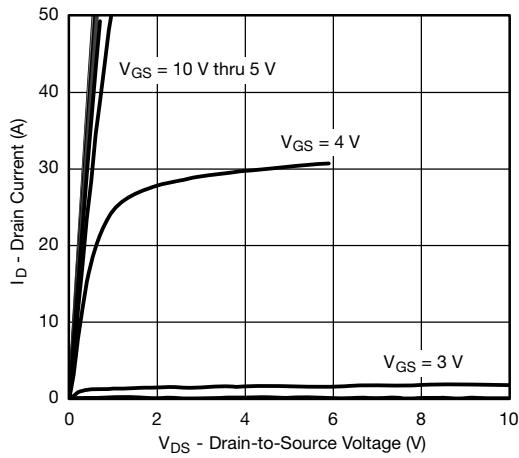
Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

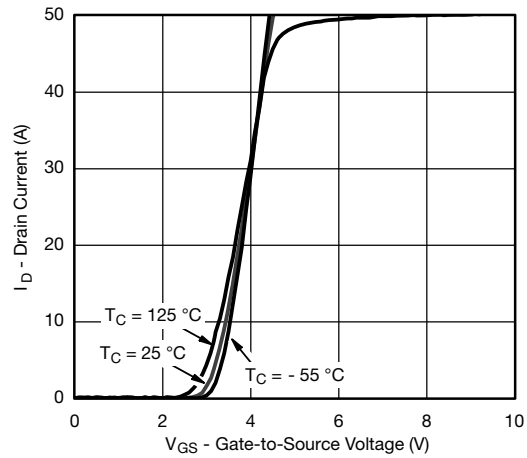
Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



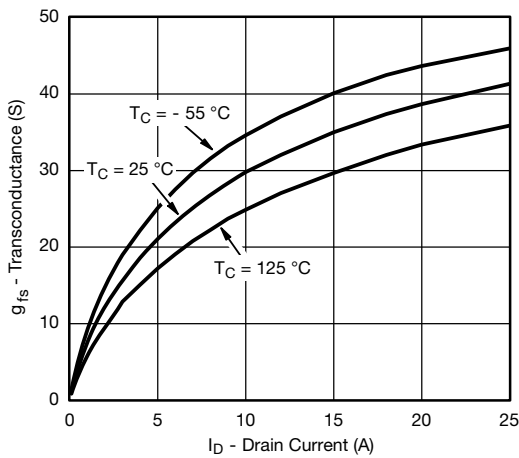
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



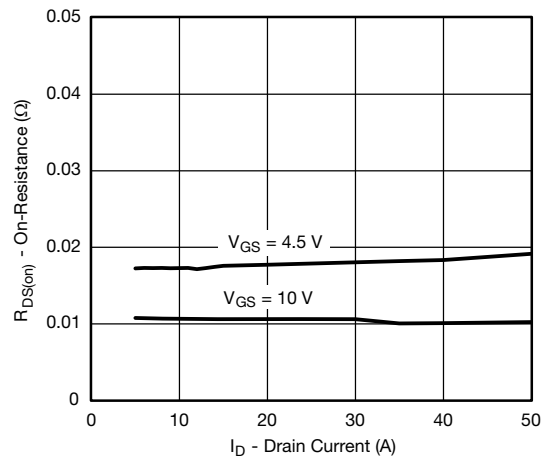
Output Characteristics



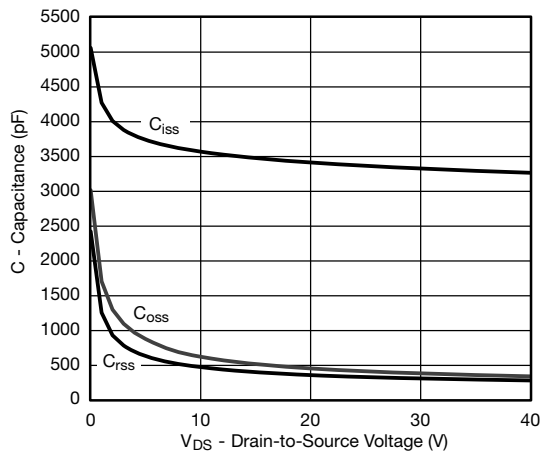
Transfer Characteristics



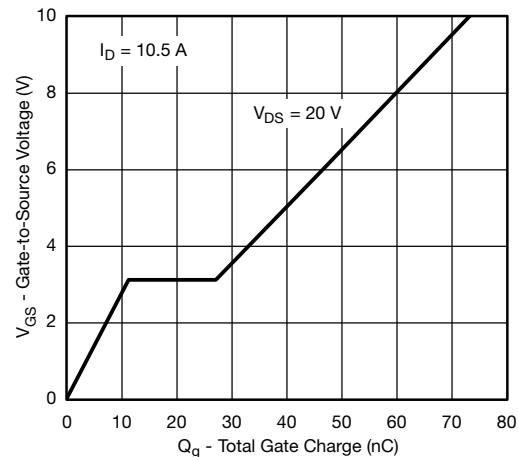
Transconductance



On-Resistance vs. Drain Current



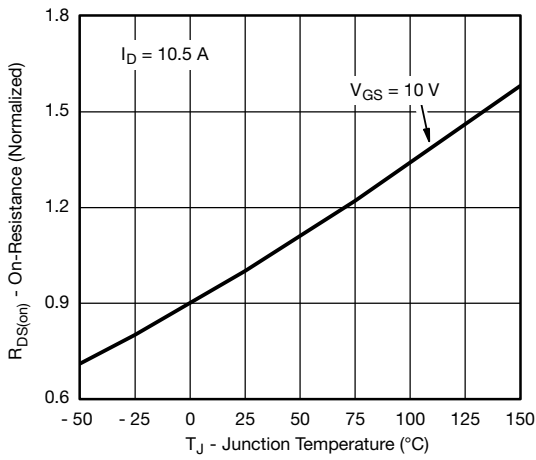
Capacitance



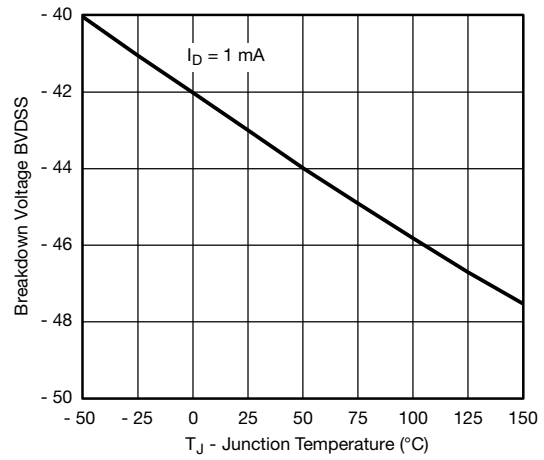
Gate Charge



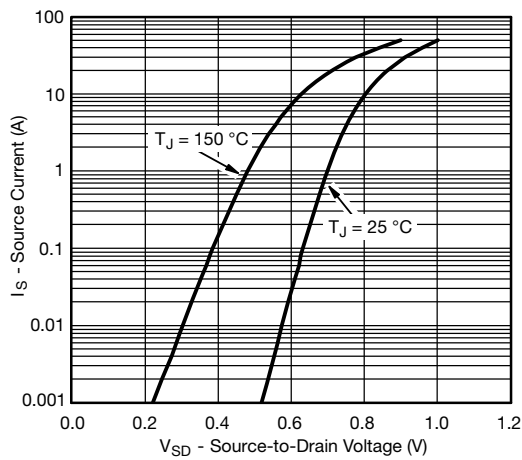
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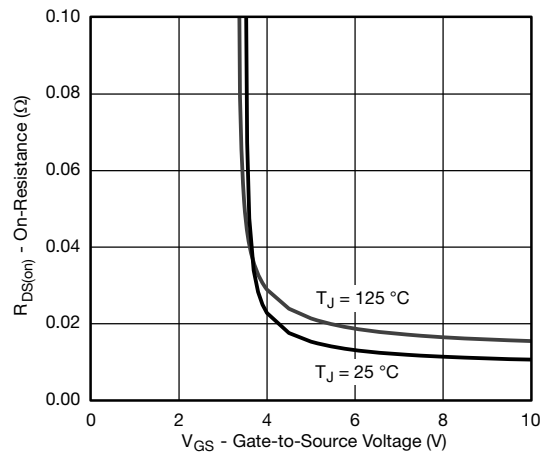
On-Resistance vs. Junction Temperature



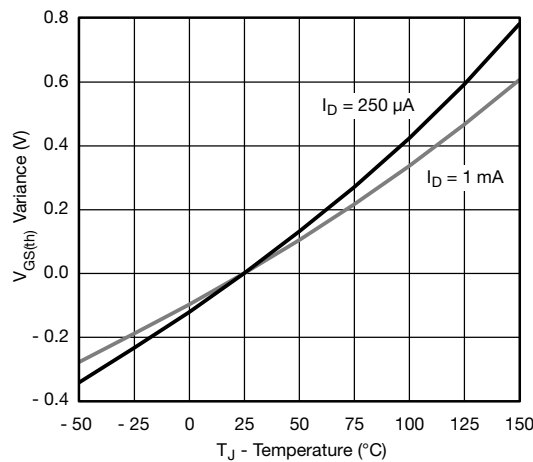
Breakdown Voltage BVDSS vs. Junction Temperature



Source Drain Diode Forward Voltage



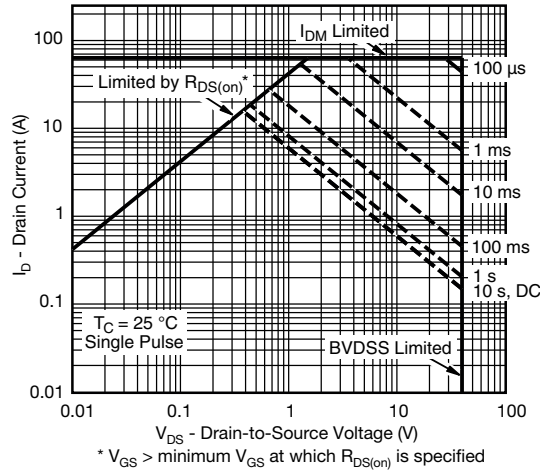
On-Resistance vs. Gate-to-Source Voltage



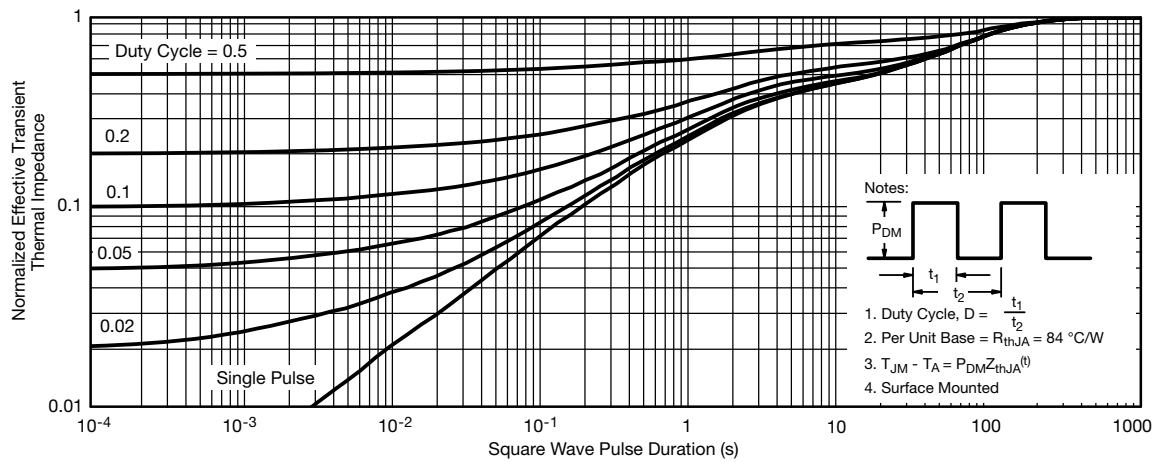
Threshold Voltage



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



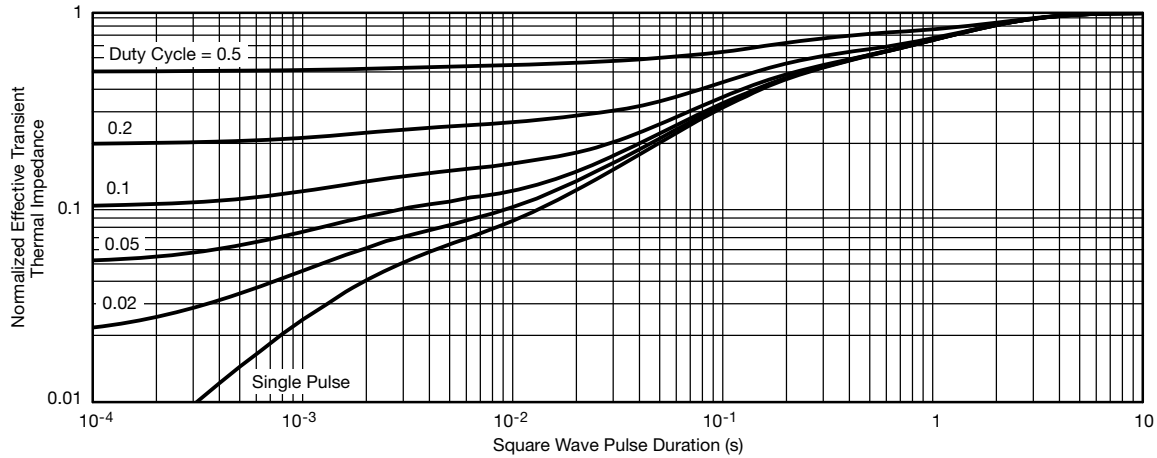
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Foot

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Foot (25 °C)
 are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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