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Product Information Notification

Product Group: SIL/Wed Apr 10, 2024/PIN-SIL-024-2024-REV-0



Revision in SQ2301ES Datasheet from Rev. C to Rev. D

For further information, please contact your regional Vishay office.

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Description of Change: As part of Vishay Siliconix commitment to Quality, we would like to extend to you a courtesy advisory notification of a datasheet revision for SQ2301ES (Doc #66718 Rev D attached). There is no change to the materials or processes used in the manufacture of this part.

The changes per this Advisory reflect updates as follows:

Minimum specification for Rg change from 5.5 Ohms to 2.8 Ohms

This notification is for information only and there is no need for a response.

Reason for Change: Datasheet Revision

Expected Influence on Quality/Reliability/Performance: None

Part Numbers/Series/Families Affected: SQ2301ES-T1_GE3, SQ2301ES-T1_BE3,

Vishay Brand(S): Vishay Siliconix

Time Schedule:

Start Shipment Date: Mon Apr 15, 2024

Sample Availability: This is a datasheet revision only. There is no change to the materials or processes used in the manufacture of this part.

Product Identification: SQ2301ES-T1_GE3, SQ2301ES-T1_BE3

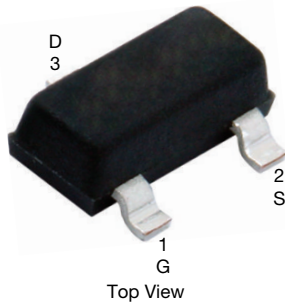
Qualification Data: N/A

Issued By: Lance Gurrola, automostechsupport@vishay.com



Automotive P-Channel 20 V (D-S) 175 °C MOSFET

SOT-23 (TO-236)

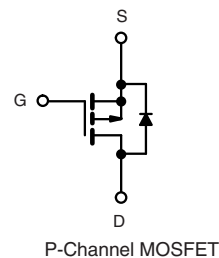


FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified^d
- 100 % R_g and UIS tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE



PRODUCT SUMMARY

V_{DS} (V)	-20
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.120
$R_{DS(on)}$ (Ω) at $V_{GS} = -2.5$ V	0.180
I_D (A)	-3.9
Configuration	Single

ORDERING INFORMATION

Package	SOT-23
Lead (Pb)-free and halogen-free	SQ2301ES (for detailed order number please see www.vishay.com/doc?79771)

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	-20	V
Gate-source voltage	V_{GS}	± 8	
Continuous drain current	I_D	-3.9	A
		-2.2	
Continuous source current (diode conduction)	I_S	-3.7	
Pulsed drain current ^a	I_{DM}	-15	
Single pulse avalanche current	I_{AS}	-9	mJ
Single pulse avalanche energy	E_{AS}	4	
Maximum power dissipation ^a	P_D	3	W
		1	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to + 175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R_{thJA}	166	°C/W
Junction-to-case (drain)	R_{thJF}	50	

Notes

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



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		-20	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA		-0.45	-	-1.5	
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V		-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{GS} = 0 V	V _{DS} = -20 V	-	-	-1	μA
		V _{GS} = 0 V	V _{DS} = -20 V, T _J = 125 °C	-	-	-50	
		V _{GS} = 0 V	V _{DS} = -20 V, T _J = 175 °C	-	-	-150	
On-state drain current ^a	I _{D(on)}	V _{GS} = -4.5 V	V _{DS} ≥ 5 V	-8	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = -4.5 V	I _D = -2.8 A	-	0.080	0.120	Ω
		V _{GS} = -2.5 V	I _D = -2 A	-	0.110	0.180	
Forward transconductance ^a	g _{fs}	V _{DS} = -1.6 V, I _D = -2.8 A		-	7	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = -10 V, f = 1 MHz	-	340	425	pF
Output capacitance	C _{oss}			-	80	100	
Reverse transfer capacitance	C _{rss}			-	55	70	
Total gate charge ^c	Q _g	V _{GS} = -4.5 V	V _{DS} = -10 V, I _D = -2.8 A	-	5	8	nC
Gate-source charge ^c	Q _{gs}			-	0.7	-	
Gate-drain charge ^c	Q _{gd}			-	1.3	-	
Gate resistance	R _g	f = 1 MHz		2.8	10	14.5	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = -10 V, R _L = 10 Ω I _D ≅ -1 A, V _{GEN} = -4.5 V, R _g = 1 Ω		-	15	22	ns
Rise time ^c	t _r			-	14	21	
Turn-off delay time ^c	t _{d(off)}			-	30	45	
Fall time ^c	t _f			-	9	15	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	-15	A
Forward voltage	V _{SD}	I _F = -1.6 A, V _{GS} = 0		-	-0.8	-1.2	V

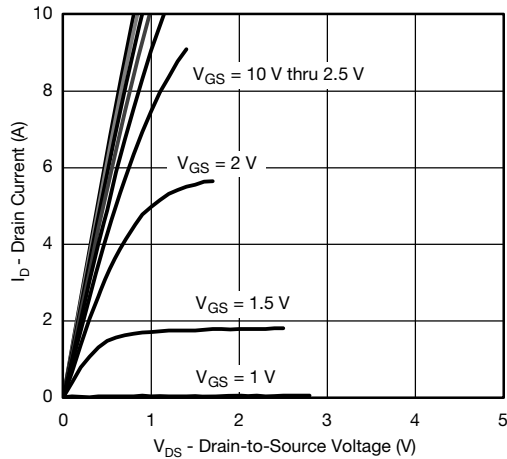
Notes

- e. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
 f. Guaranteed by design, not subject to production testing
 g. Independent of operating temperature

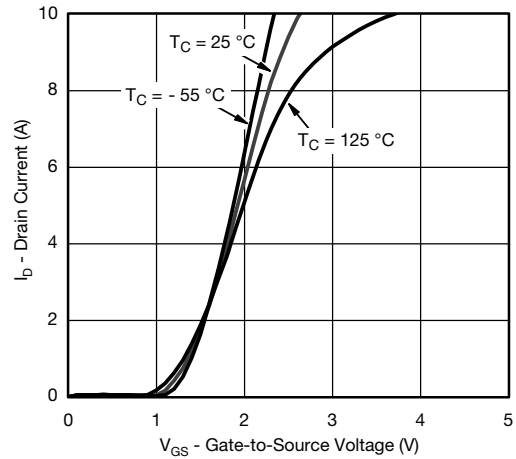
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



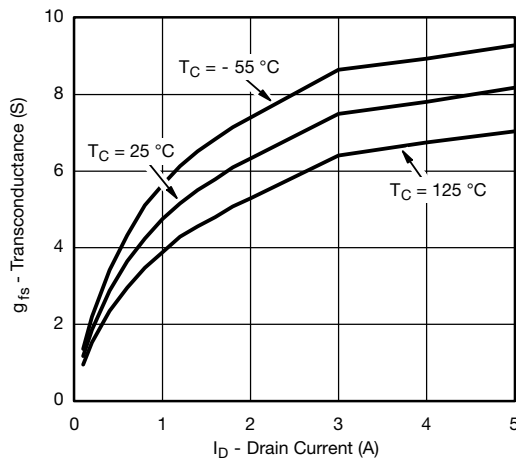
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



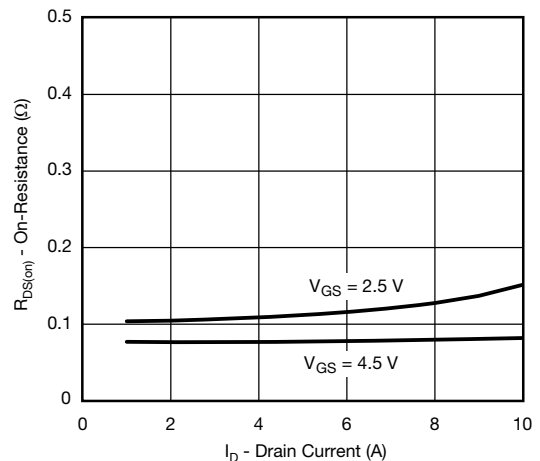
Output Characteristics



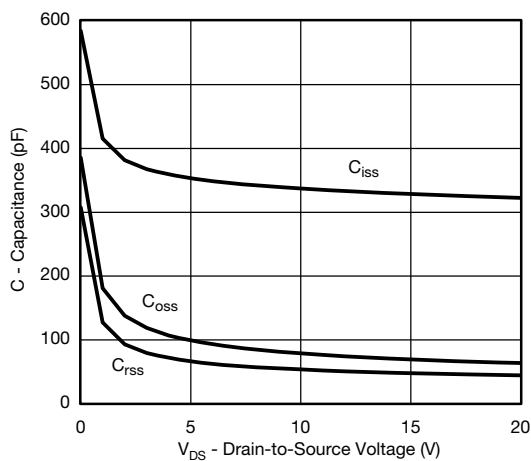
Transfer Characteristics



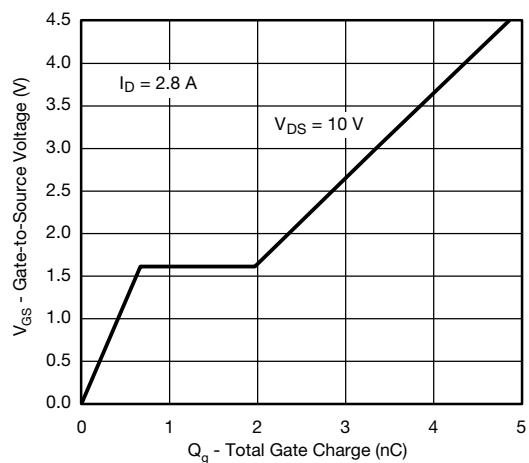
Transconductance



On-Resistance vs. Drain Current



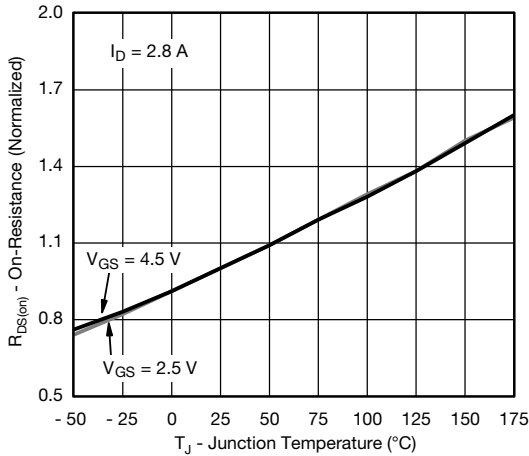
Capacitance



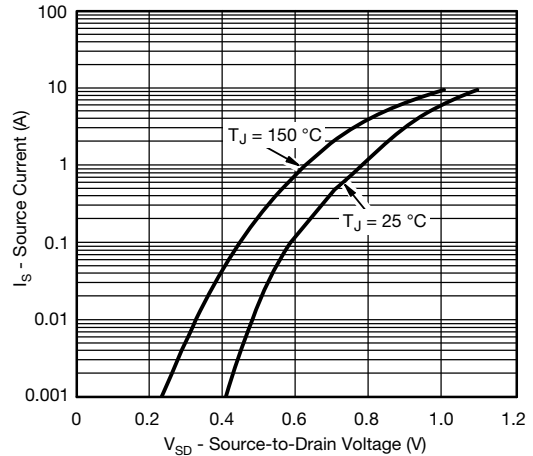
Gate Charge



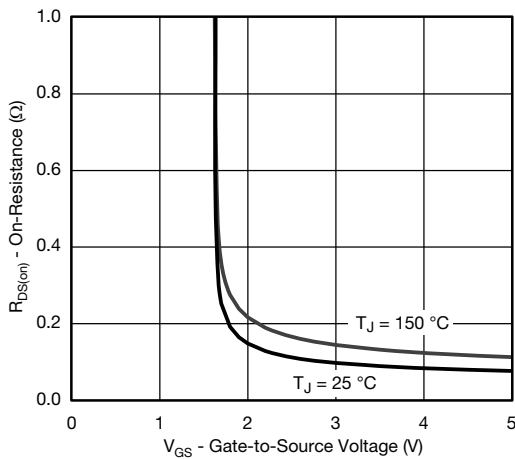
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



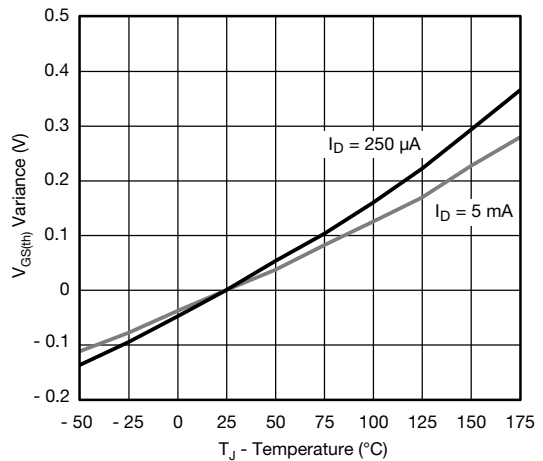
On-Resistance vs. Junction Temperature



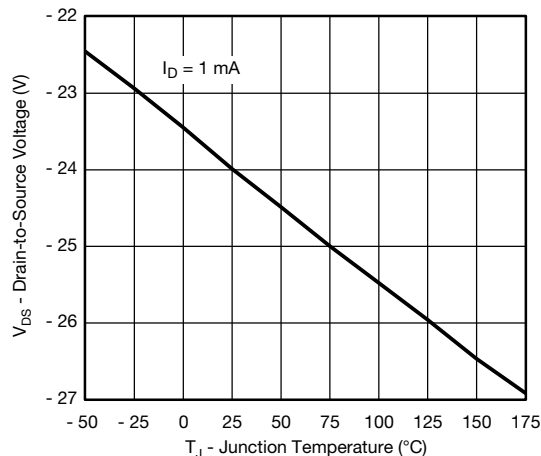
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



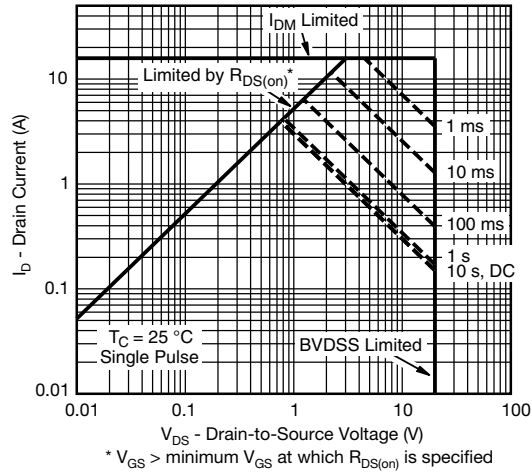
Threshold Voltage



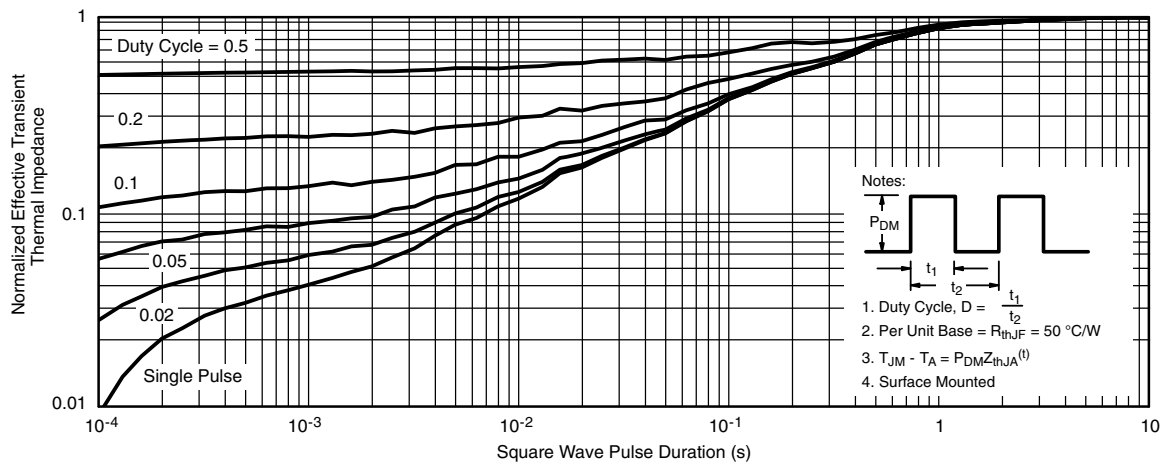
Drain Source Breakdown vs. Junction Temperature



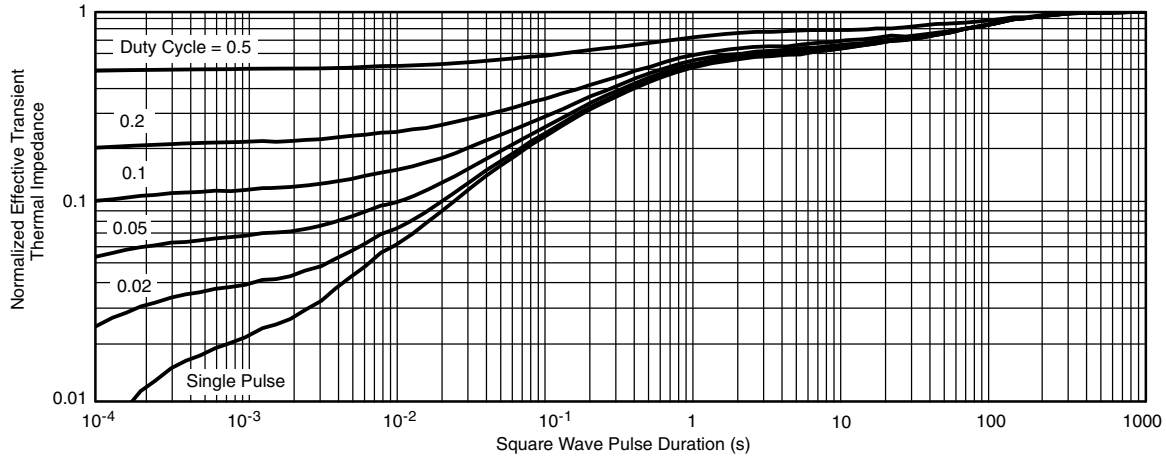
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Foot


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

Normalized Thermal Transient Impedance, Junction-to-Ambient
Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Foot ($25\text{ }^{\circ}\text{C}$)
 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

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?66718.