Product Termination Notification

Product Group: SIL/Mon Mar 25, 2024/PTN-SIL-020-2024-REV-0

Conversion to Copper (Cu) Wire – SQ2389ES

For further information, please contact your regional Vishay office.

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Description of Change: The affected part number listed in this notification will be converted to a Copper wire material set. The new ordering code is SQ2389CES-T1_GE3 which has Identical silicon technology and silicon die design as SQ2389ES. Small changes to the data sheet AC parameters are a consequence of lot to lot variation and/or updated characterization methods (reference: SQ2389CES Doc # 62212 Rev.A). Device performance in the application will not be impacted. There will be no change to the wafer fab location.

Reason for Change: Standardization of materials

Expected Influence on Quality/Reliability/Performance: None

Part Numbers/Series/Families Affected: SQ2389ES-T1_GE3, SQ2389ES-T1_BE3,

Vishay Brand(S): Vishay Siliconix

Time Schedule:

Last Time Buy Date: Sat Sep 28, 2024

Last Time Ship Date: Sat Mar 29, 2025

Sample Availability: Qualified samples of replacement product are available on request

Product Identification: SQ2389CES-T1_GE3

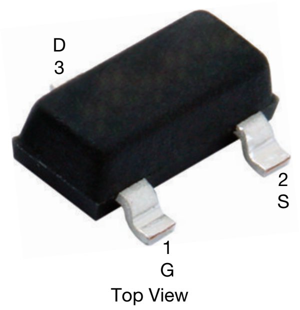
Qualification Data: AEC Q101 qualification data of replacement product is available. Qualification PPAP is available now.

This PTN is considered approved, without further notification, unless we receive specific customer concerns before Sat Sep 28, 2024 or as specified by contract.

Issued By: Lance Gurrola, automostechsupport@vishay.com

Automotive P-Channel 40 V (D-S) 175 °C MOSFET

SOT-23 (TO-236)

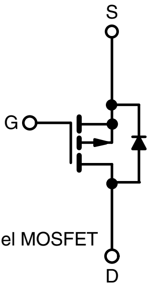


Marking Code: 9UYXX

FEATURES

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

AUTOMOTIVE GRADE
Pb-free
RoHS COMPLIANT
HALOGEN FREE



P-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	-40
$R_{DS(on)}$ (Ω) at V_{GS} = -10 V	0.094
$R_{DS(on)}$ (Ω) at V_{GS} = -4.5 V	0.188
I_D (A)	-4.1
Configuration	Single

ORDERING INFORMATION	
Package	SOT-23
Lead (Pb)-free and halogen-free	SQ2389CES (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}	-40	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current	T_C = 25 °C	I_D	-4.1	A
	T_C = 125 °C		-2.4	
Continuous source current (diode conduction)		I_S	-3.6	
Pulsed drain current [a]		I_{DM}	-16	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	-12	
Single pulse avalanche energy		E_{AS}	7.2	mJ
Maximum power dissipation	T_C = 25 °C	P_D	3	W
	T_C = 125 °C		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	PCB mount [b]	R_{thJA}	166	°C/W
Junction-to-foot (drain)		R_{thJF}	50	

Notes

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b. When mounted on 1" square PCB (FR4 material)

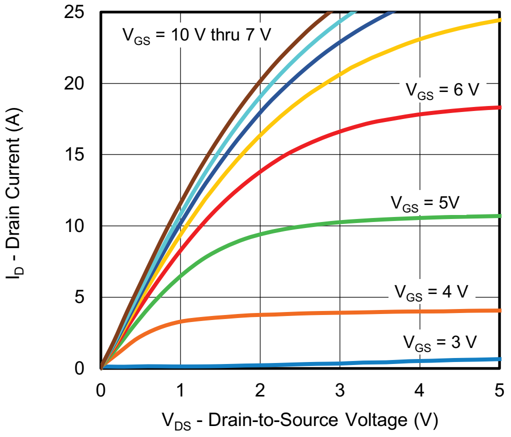
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = -250 µA		-40	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250 µA		-1.5	-2.0	-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	µA
		V_{GS} = 0 V	V_{DS} = -40 V, T_J = 125 °C	-	-	-50	
		V_{GS} = 0 V	V_{DS} = -40 V, T_J = 175 °C	-	-	-150	
On-state drain current [a]	$I_{D(on)}$	V_{GS} = -10 V	$V_{DS} \leq$ -5 V	-10	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = -10 V	I_D = -3 A	-	0.084	0.094	Ω
		V_{GS} = -10 V	I_D = -3 A, T_J = 125 °C	-	-	0.144	
		V_{GS} = -10 V	I_D = -3 A, T_J = 175 °C	-	-	0.169	
		V_{GS} = -4.5 V	I_D = -3 A	-	0.140	0.188	
Forward transconductance [b]	g_{fs}	V_{DS} = -10 V, I_D = -3 A		-	5	-	S
Dynamic [b]							
Input capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = -20 V, f = 1 MHz	-	414	455	pF
Output capacitance	C_{oss}			-	80	100	
Reverse transfer capacitance	C_{rss}			-	42	54	
Total gate charge [c]	Q_g	V_{GS} = -10 V	V_{DS} = -20 V, I_D = -3 A	-	8.2	12	nC
Gate-source charge [c]	Q_{gs}			-	1.1	-	
Gate-drain charge [c]	Q_{gd}			-	3.0	-	
Gate resistance	R_g	f = 1 MHz		3.1	4.1	7	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = -20 V, R_L = 6.7 Ω $I_D \cong$ -3 A, V_{GEN} = -10 V, R_g = 1 Ω		-	7	10	ns
Rise time [c]	t_r			-	12	16	
Turn-off delay time [c]	$t_{d(off)}$			-	16	20	
Fall time [c]	t_f			-	4	8	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed current [a]	I_{SM}			-	-	-10	A
Forward voltage	V_{SD}	I_F = -1.5 A, V_{GS} = 0 V		-	-0.8	-1.2	V
Body diode reverse recovery time	t_{rr}	I_F = -2 A, di/dt = 100 A/µs		-	17	34	ns
Body diode reverse recovery charge	Q_{rr}			-	14	28	nC
Reverse recovery fall time	t_a			-	14	-	ns
Reverse recovery rise time	t_b			-	3	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	-1.99	-	A

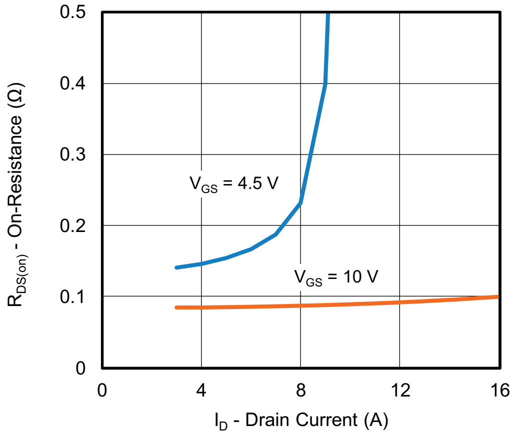
Notes

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

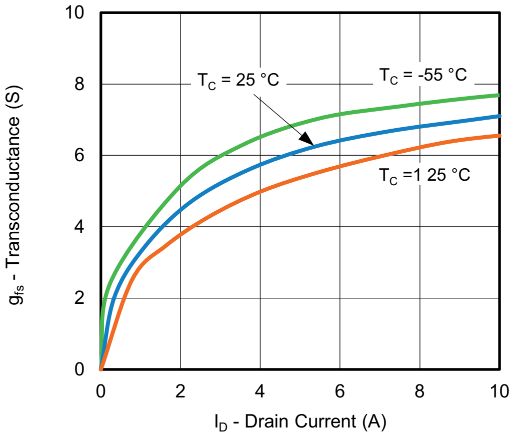
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



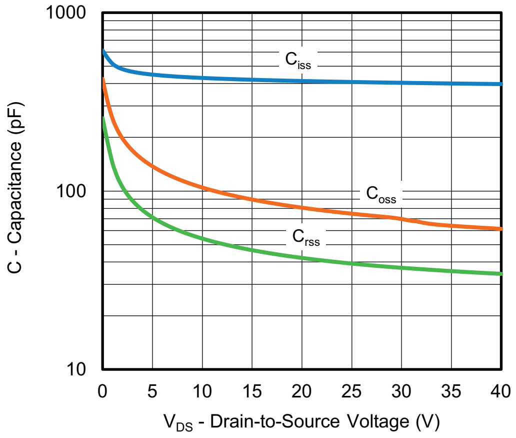
Output Characteristics



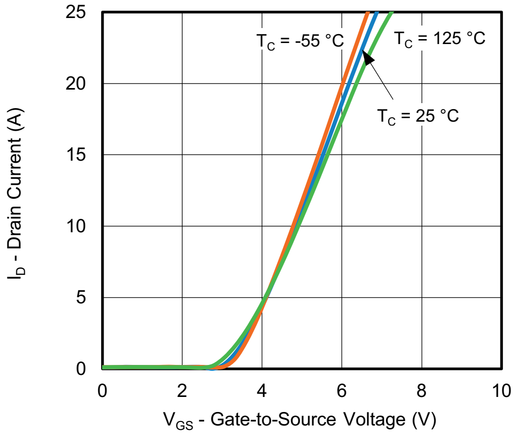
On-Resistance vs. Drain Current



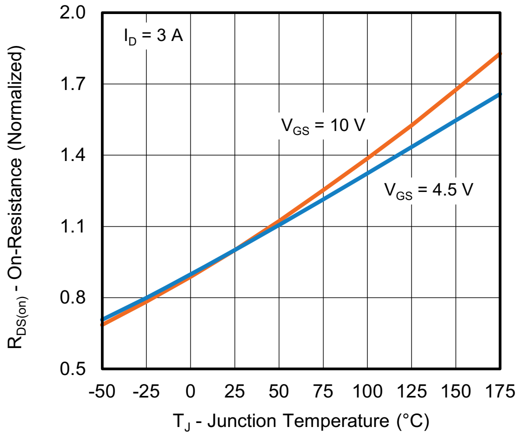
Transconductance



Capacitance

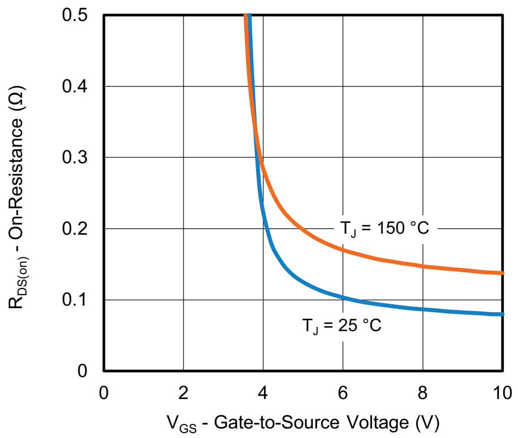


Transfer Characteristics

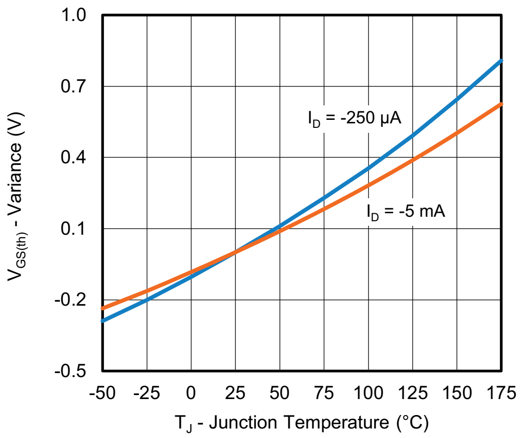


On-Resistance vs. Junction Temperature

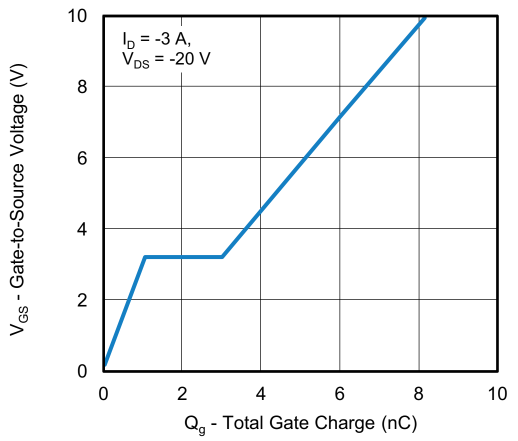
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



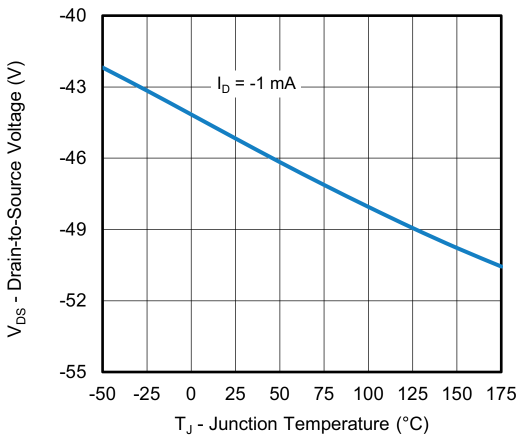
On-Resistance vs. Gate-Source Voltage



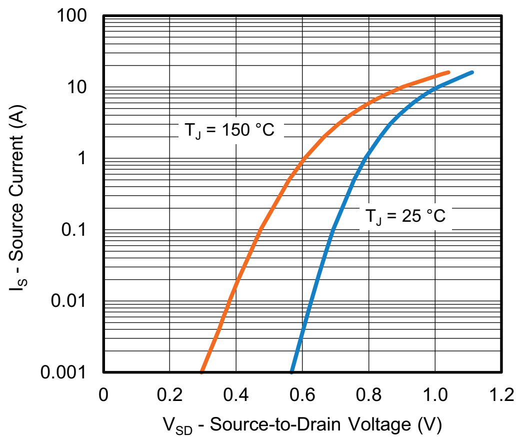
Threshold Voltage



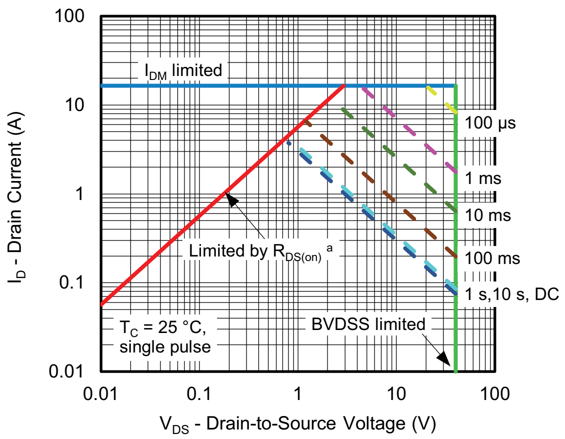
Gate Charge



Drain Source Breakdown vs. Junction Temperature



Source-Drain Diode Forward Voltage

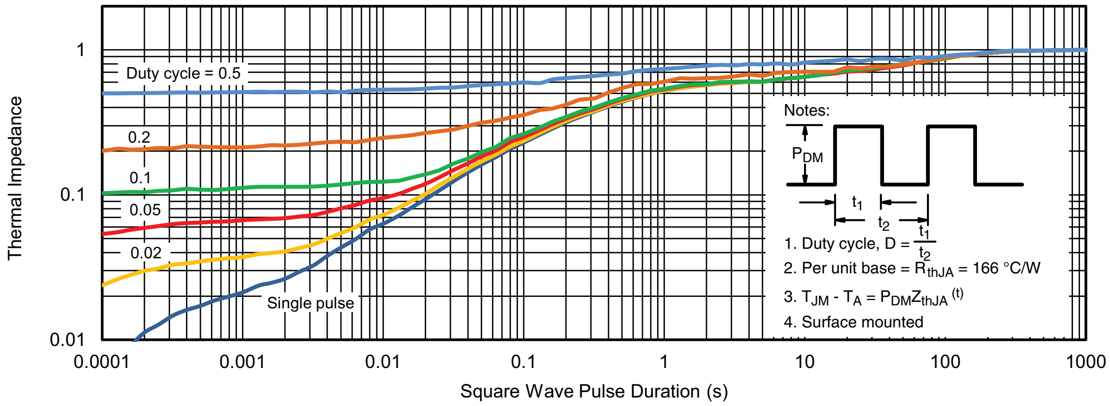


Safe Operating Area

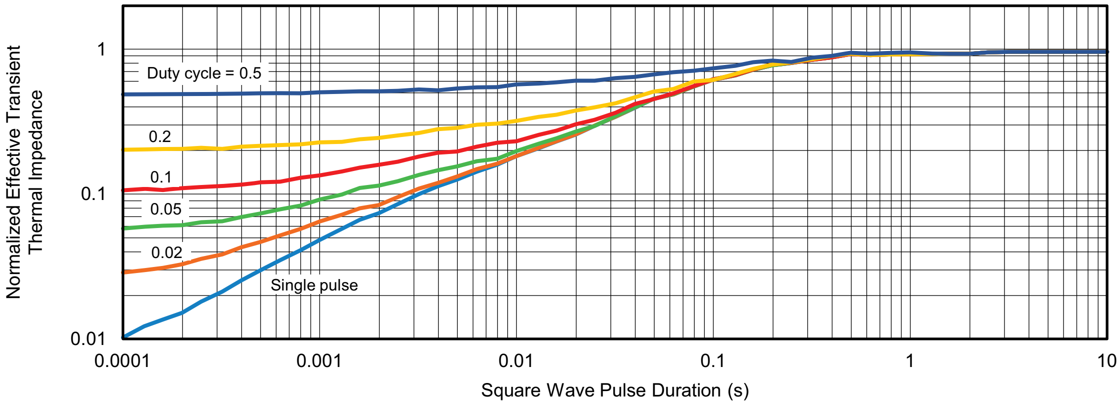
Note

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

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



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

Notes

- 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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