Automotive Dual P-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	- 60
$R_{DS(on)}$ (Ω) at V_{GS} = - 10 V	4
$R_{DS(on)}$ (Ω) at V_{GS} = - 4.5 V	8
I_D (A)	- 0.19
Configuration	Dual

FEATURES

- TrenchFET® Power MOSFET
- Typical ESD Protection: 2000 V
- AEC-Q101 Qualified[c]
- 100 % R_g Tested
- Material categorization:
  For definitions of compliance please see www.vishay.com/doc?99912

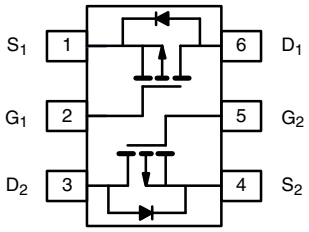
AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

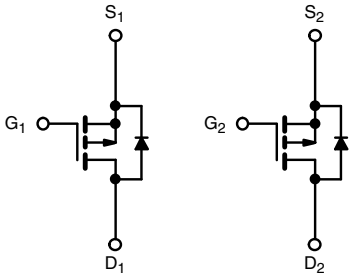
HALOGEN FREE

SC-89



Top View

Marking Code: 7



P-Channel MOSFET P-Channel MOSFET

ORDERING INFORMATION	
Package	SC-89
Lead (Pb)-free and Halogen-free	SQ1025X-T1-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	- 60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	T_A = 25 °C	I_D	- 0.19	A
	T_A = 125 °C		- 0.11	
Continuous Source Current (Diode Conduction)		I_S	- 0.38	
Pulsed Drain Current[a]		I_{DM}	- 0.75	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	0.300	W
	T_A = 125 °C		0.100	
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}	500	°C/W

Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. When mounted on 1" square PCB (FR-4 material).
c. Parametric verification ongoing.

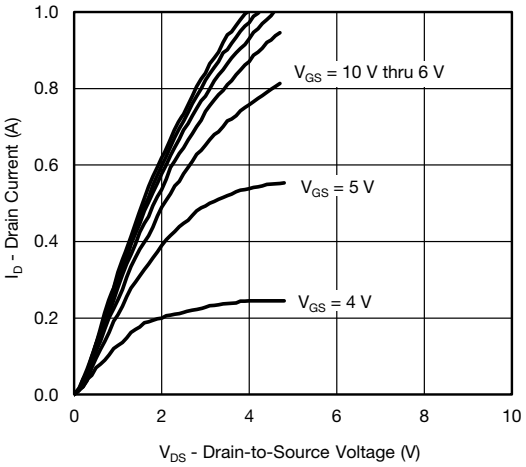
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA		- 60	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA		- 1	- 2	- 3	
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 12 V		-	-	± 1	µA
		V_{DS} = 0 V, V_{GS} = ± 20 V		-	-	± 1	mA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = - 60 V	-	-	- 1	µA
		V_{GS} = 0 V	V_{DS} = - 60 V, T_J = 125 °C	-	-	- 50	
		V_{GS} = 0 V	V_{DS} = - 60 V, T_J = 175 °C	-	-	- 150	
On-State Drain Current[a]	$I_{D(on)}$	V_{GS} = - 10 V	V_{DS} ≤ - 5 V	- 0.5	-	-	A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V	I_D = - 500 mA	-	2.81	4	Ω
		V_{GS} = - 10 V	I_D = - 500 mA, T_J = 125 °C	-	-	6.88	
		V_{GS} = - 10 V	I_D = - 500 mA, T_J = 175 °C	-	-	8.52	
		V_{GS} = - 4.5 V	I_D = - 250 mA	-	3.8	8	
Forward Transconductance[b]	g_{fs}	V_{DS} = - 10 V, I_D = - 100 mA		-	0.100	-	S
Dynamic[b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = - 25 V, f = 1 MHz	-	26	33	pF
Output Capacitance	C_{oss}			-	6	8	
Reverse Transfer Capacitance	C_{rss}			-	3	4	
Total Gate Charge[c]	Q_g	V_{GS} = - 10 V	V_{DS} = - 30 V, I_D = - 500 mA	-	1.05	1.6	nC
Gate-Source Charge[c]	Q_{gs}			-	0.22	-	
Gate-Drain Charge[c]	Q_{gd}			-	0.17	-	
Gate Resistance	R_g	f = 1 MHz		100	222	350	Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = - 30 V, R_L = 182 Ω I_D ≅ - 165 mA, V_{GEN} = - 10 V, R_g = 1 Ω		-	6	9	ns
Rise Time	t_r			-	8	12	
Turn-Off Delay Time[c]	$t_{d(off)}$			-	17	26	
Fall Time	t_f			-	13	20	
Diode Ratings and Characteristics[b]							
Pulsed Current[a]	I_{SM}			-	-	- 0.75	A
Forward Voltage	V_{SD}	I_F = - 200 mA, V_{GS} = 0 V		-	- 0.88	- 1.2	V

Notes

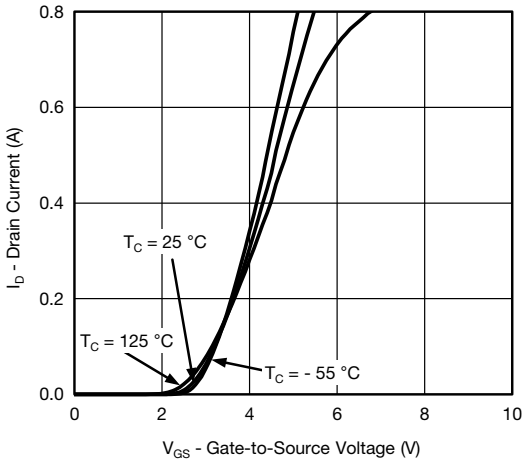
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

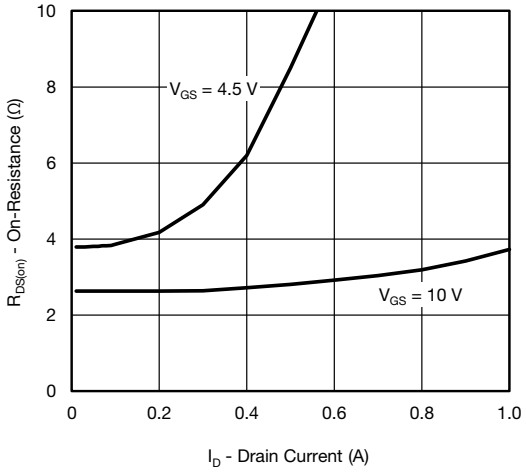
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



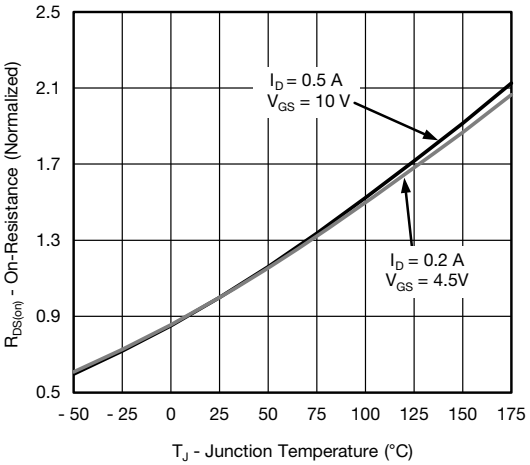
Output Characteristics



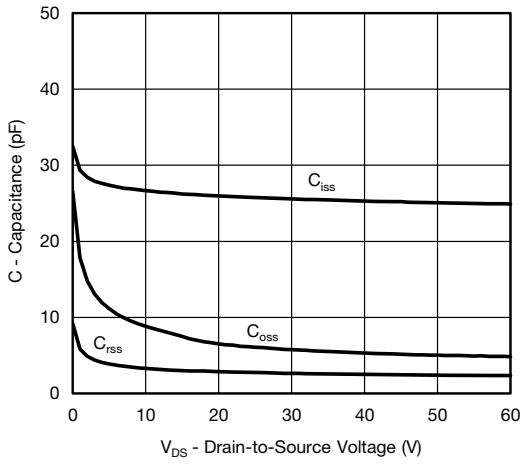
Transfer Characteristics



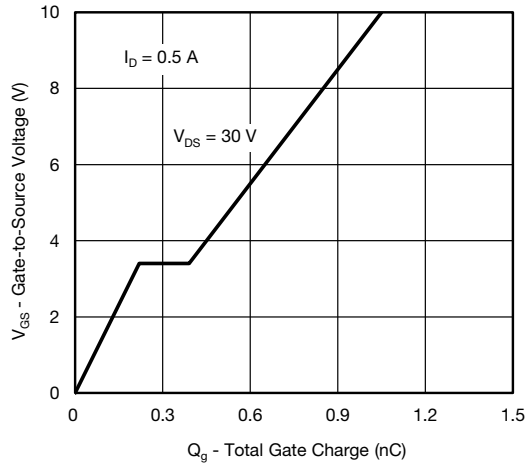
On-Resistance vs. Drain Current



On-Resistance vs. Junction Temperature

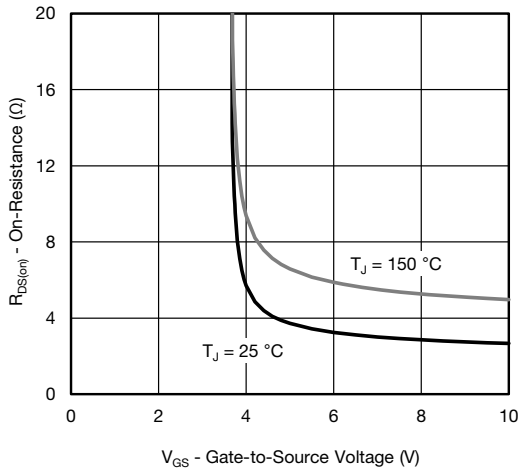


Capacitance

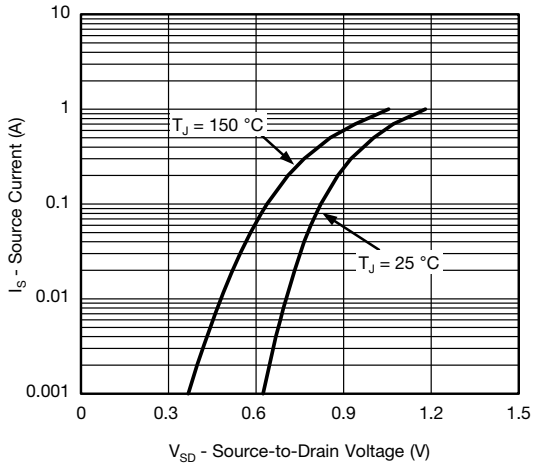


Gate Charge

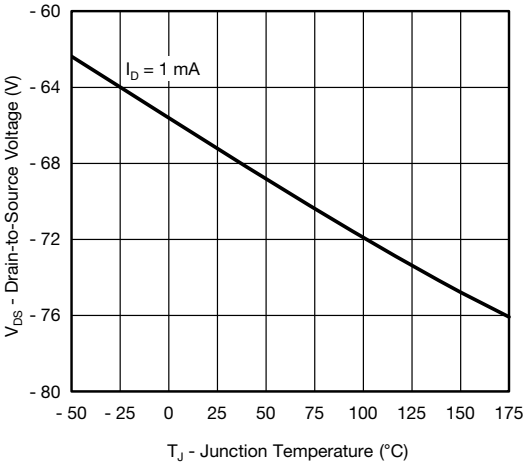
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



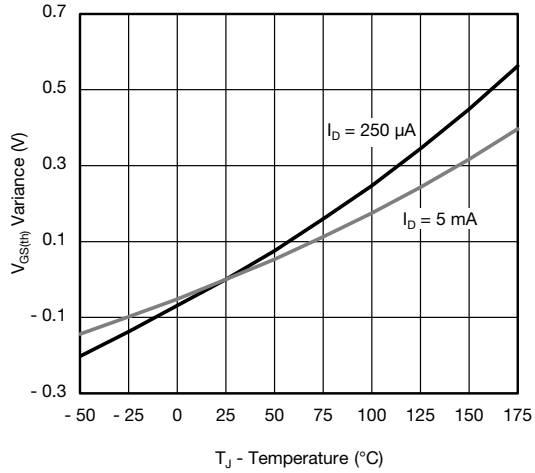
On-Resistance vs. Gate-to-Source Voltage



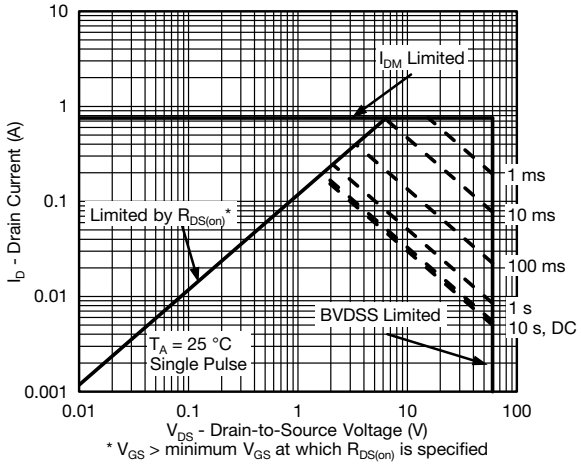
Source-Drain Diode Forward Voltage



Drain Source Breakdown vs. Junction Temperature

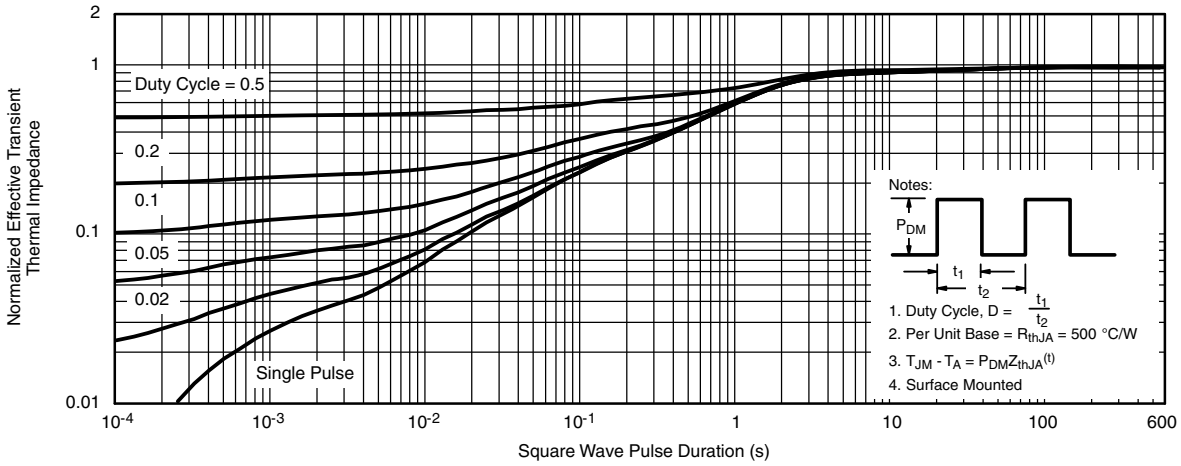


Threshold Voltage



Safe Operating Area

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



Normalized Thermal Transient Impedance, Junction-to-Ambient

Note

- The characteristics shown in the the graph Normalized Transient Thermal Impedance Junction to Ambient (25 °C) is 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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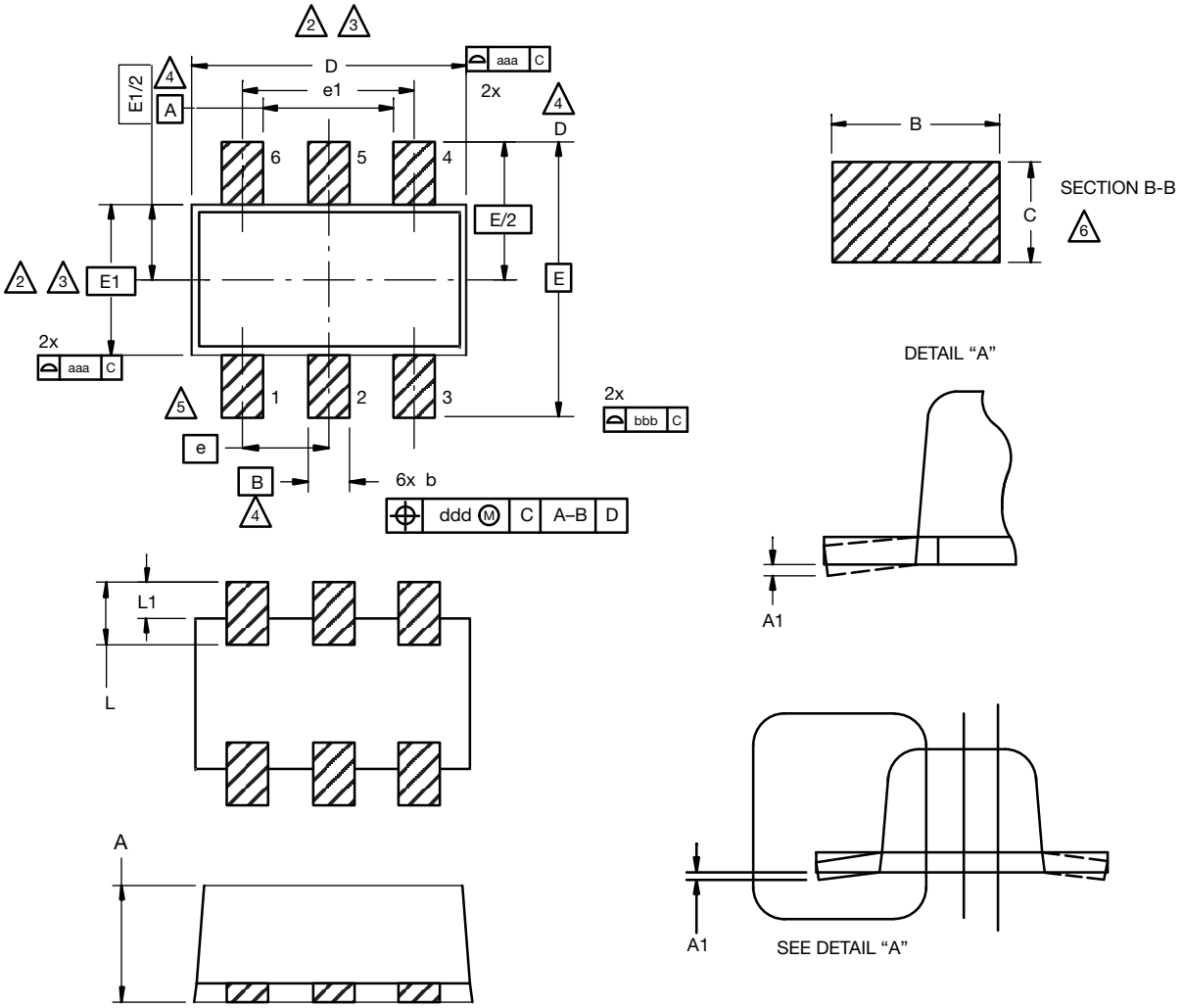
SC-89 6-Leads (SOT-563F)



Notes

1. Dimensions in millimeters.

2. Dimension D does not include mold flash, protrusions or gate burrs. Mold flush, protrusions or gate burrs shall not exceed 0.15 mm per dimension E1 does not include interlead flash or protrusion, interlead flash or protrusion shall not exceed 0.15 mm per side.

3. Dimensions D and E1 are determined at the outmost extremes of the plastic body exclusive of mold flash, the bar burrs, gate burrs and interlead flash, but including any mismatch between the top and the bottom of the plastic body.

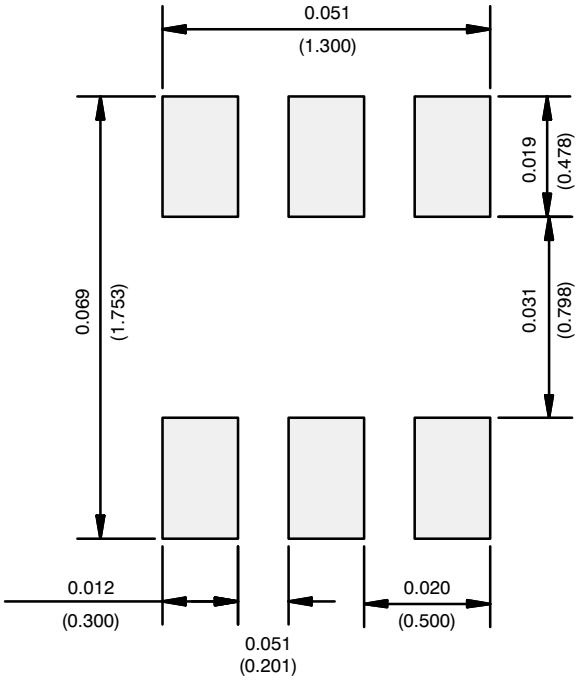
4. Datums A, B and D to be determined 0.10 mm from the lead tip.

5. Terminal numbers are shown for reference only.

6. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.56	0.58	0.60
A1	0	0.02	0.10
b	0.15	0.22	0.30
c	0.10	0.14	0.18
D	1.50	1.60	1.70
E	1.50	1.60	1.70
E1	1.15	1.20	1.25
e	0.45	0.50	0.55
e1	0.95	1.00	1.05
L	0.25	0.35	0.50
L1	0.10	0.20	0.30
C14-0439-Rev. C, 11-Aug-14 DWG: 5880			

RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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