

Dual P-Channel 12-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 12	0.018 at $V_{GS} = - 4.5$ V	- 8.9
	0.022 at $V_{GS} = - 2.5$ V	- 8.1
	0.028 at $V_{GS} = - 1.8$ V	- 3.6

FEATURES

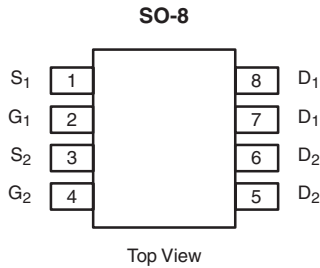
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Advanced High Cell Density Process
- Compliant to RoHS Directive 2002/95/EC



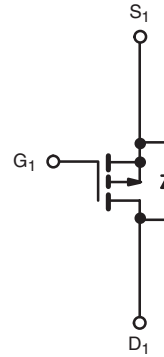
RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

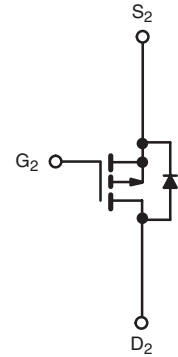
- Load Switching



Ordering Information: Si4931DY-T1-E3 (Lead (Pb)-free)
Si4931DY-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET



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ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

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Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	- 12		V
Gate-Source Voltage		V_{GS}	± 8		
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) ^a	$T_A = 25\text{ }^{\circ}\text{C}$	I_D	- 8.9	- 6.7	A
	$T_A = 70\text{ }^{\circ}\text{C}$		- 7.1	- 5.4	
Pulsed Drain Current		I_{DM}	- 30		
Continuous Source Current (Diode Conduction) ^a		I_S	- 1.7	- 0.9	
Maximum Power Dissipation ^a	$T_A = 25\text{ }^{\circ}\text{C}$	P_D	2.0	1.1	W
	$T_A = 70\text{ }^{\circ}\text{C}$		1.3	0.7	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	46	62.5	$^\circ\text{C/W}$
		80	110	
Maximum Junction-to-Foot (Drain)	R_{thJF}	24	32	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

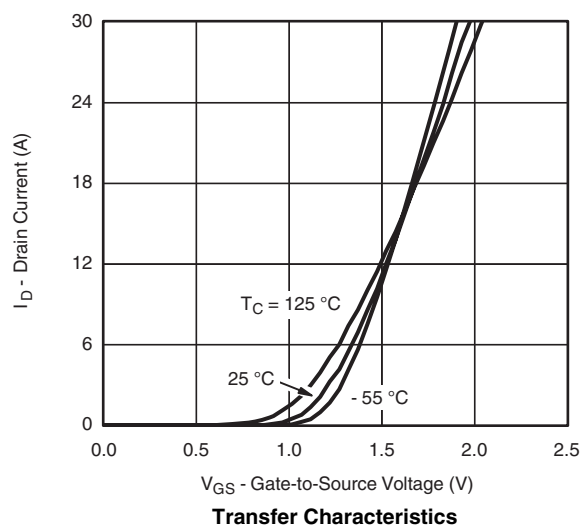
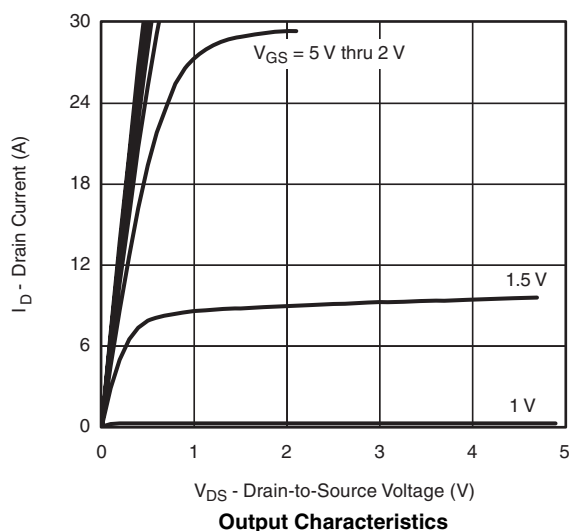
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -350\text{ }\mu\text{A}$	- 0.4		- 1.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -12\text{ V}$, $V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -12\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^{\circ}\text{C}$			- 5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}$, $V_{GS} = -4.5\text{ V}$	- 30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$, $I_D = -8.9\text{ A}$		0.0145	0.018	Ω
		$V_{GS} = -2.5\text{ V}$, $I_D = -8.1\text{ A}$		0.018	0.022	
		$V_{GS} = -1.8\text{ V}$, $I_D = -3.6\text{ A}$		0.023	0.028	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -6\text{ V}$, $I_D = -8.9\text{ A}$		26		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -1.7\text{ A}$, $V_{GS} = 0\text{ V}$		- 0.7	- 1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -6\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -8.9\text{ A}$		34.5	52	nC
Gate-Source Charge	Q_{gs}			5.1		
Gate-Drain Charge	Q_{gd}			9.6		
Gate Resistance	R_g			9		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -6\text{ V}$, $R_L = 6\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 6\text{ }\Omega$		25	40	ns
Rise Time	t_r			46	70	
Turn-Off Delay Time	$t_{d(off)}$			230	345	
Fall Time	t_f			155	235	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -1.7\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$		128	200	

Notes:

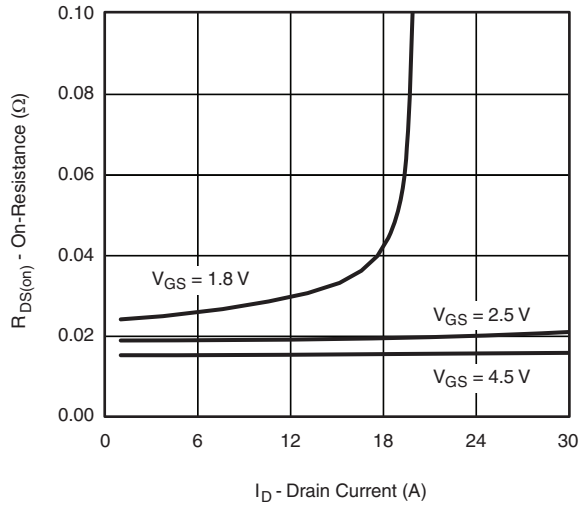
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

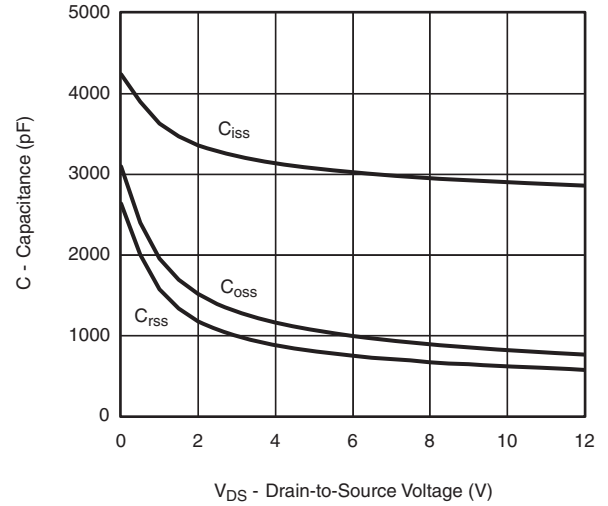
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS $25\text{ }^{\circ}\text{C}$ unless otherwise noted

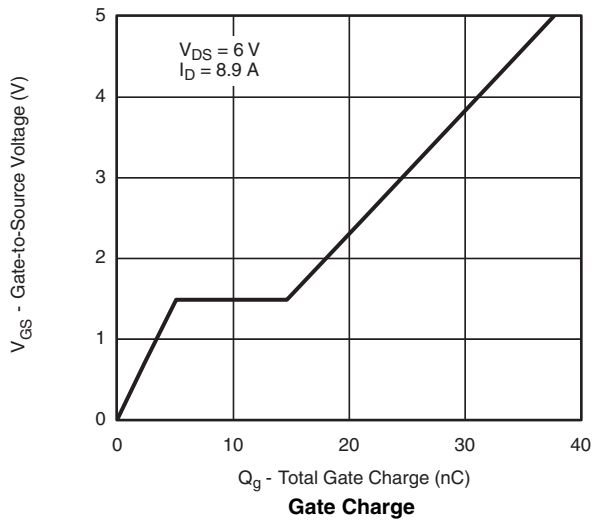
TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



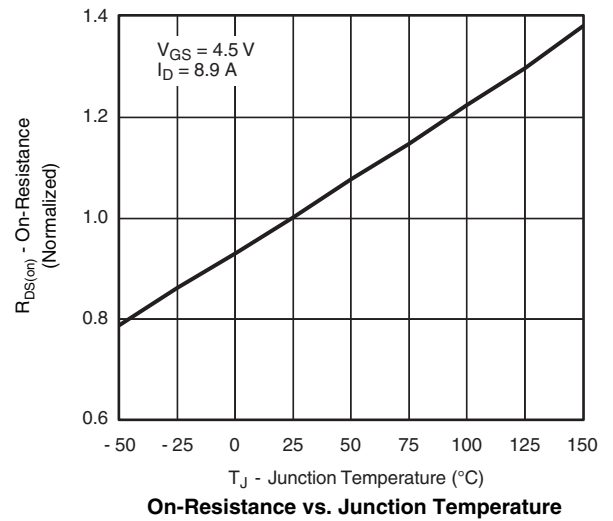
On-Resistance vs. Drain Current



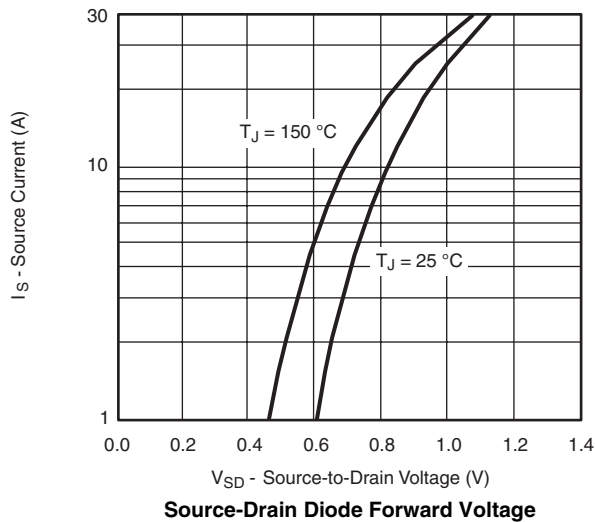
Capacitance



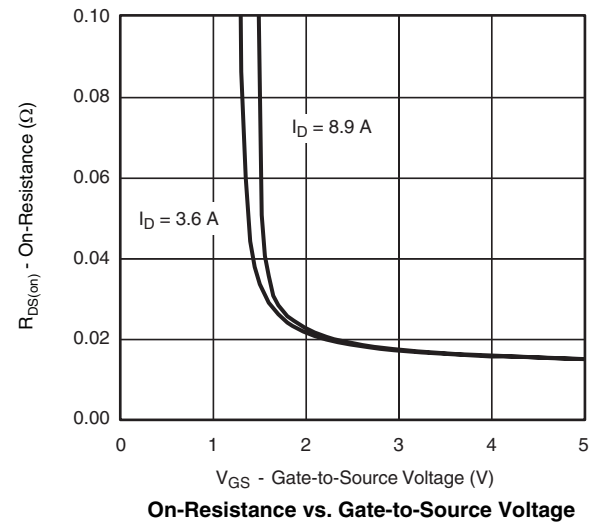
Gate Charge



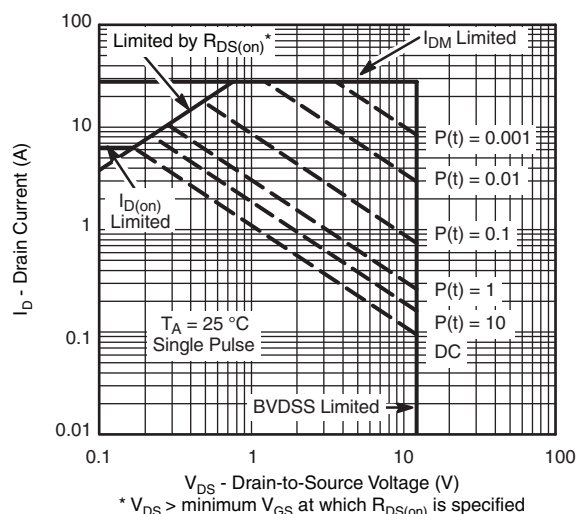
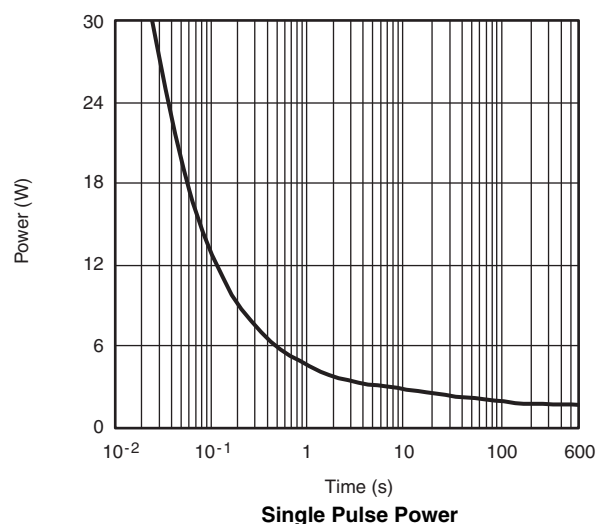
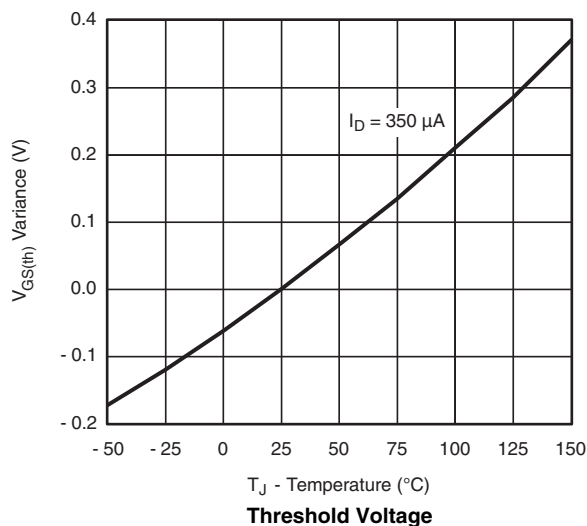
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

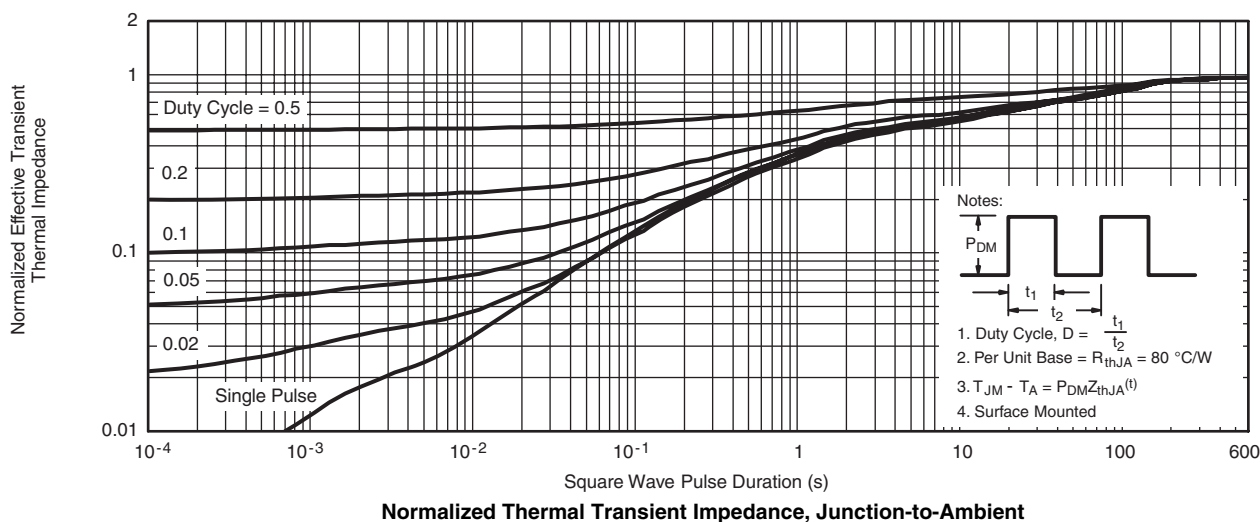


On-Resistance vs. Gate-to-Source Voltage

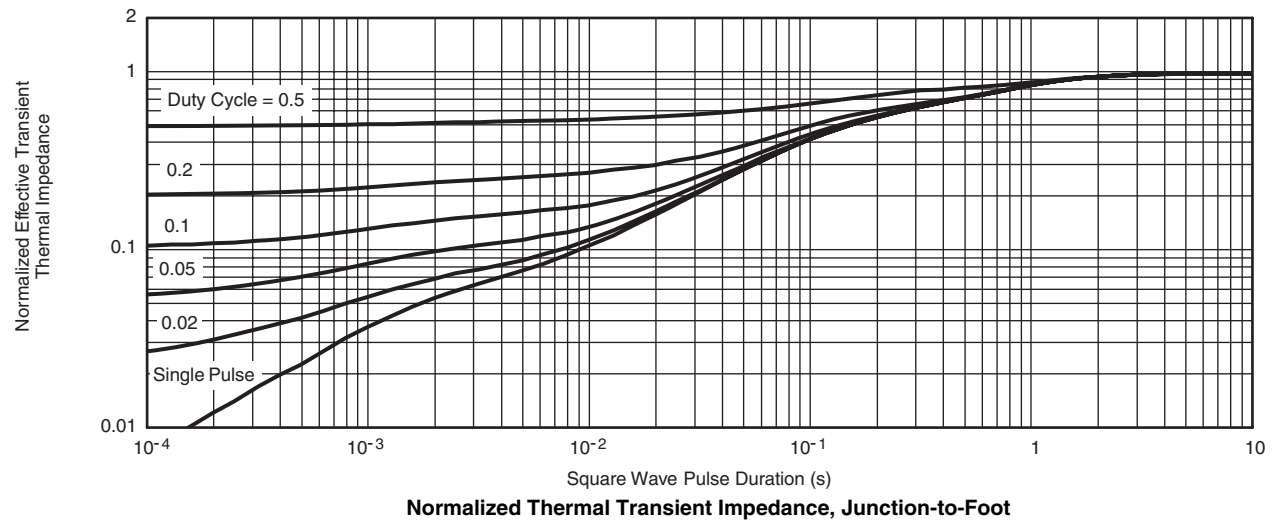
TYPICAL CHARACTERISTICS 25 °C unless otherwise noted

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

Safe Operating Area, Junction-to-Ambient



TYPICAL CHARACTERISTICS 25 °C unless otherwise noted



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SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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