

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 12	0.032 at $V_{GS} = - 4.5$ V	- 5.3
	0.042 at $V_{GS} = - 2.5$ V	- 4.6
	0.059 at $V_{GS} = - 1.8$ V	- 3.9

FEATURES

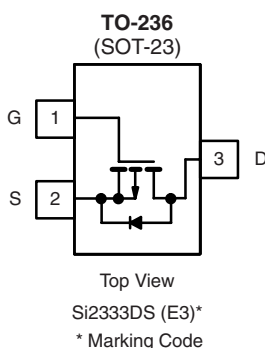
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET® Power MOSFET

APPLICATIONS

- Load Switch
- PA Switch



RoHS
COMPLIANT
HALOGEN
FREE
Available



Ordering Information: Si2333DS-T1-E3 (Lead (Pb)-free)
Si2333DS-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

Parameter	Symbol	5 s	Steady State	Unit
Drain-Source Voltage	V_{DS}	- 12		V
Gate-Source Voltage	V_{GS}	± 8		
Continuous Drain Current ($T_J = 150$ °C) ^{a, b}	$T_A = 25$ °C	- 5.3	- 4.1	A
	$T_A = 70$ °C	- 4.2	- 3.3	
Pulsed Drain Current	I_{DM}	- 20		
Continuous Source Current (Diode Conduction) ^{a, b}	I_S	- 1.0	- 0.6	
Maximum Power Dissipation ^{a, b}	$T_A = 25$ °C	1.25	0.75	W
	$T_A = 70$ °C	0.8	0.48	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150		°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	75	100	°C/W
		120	166	
Maximum Junction-to-Foot (Drain)	R_{thJF}	40	50	

Notes:

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

b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{ V}$, $I_{\text{D}} = -250\text{ }\mu\text{A}$	- 12			V
Gate-Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}$, $I_{\text{D}} = -250\text{ }\mu\text{A}$	- 0.40		- 1.0	
Gate-Body Leakage	I_{GSS}	$V_{\text{DS}} = 0\text{ V}$, $V_{\text{GS}} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = -9.6\text{ V}$, $V_{\text{GS}} = 0\text{ V}$			- 1	μA
		$V_{\text{DS}} = -9.6\text{ V}$, $V_{\text{GS}} = 0\text{ V}$, $T_J = 55\text{ }^{\circ}\text{C}$			- 10	
On-State Drain Current ^a	$I_{\text{D}(\text{on})}$	$V_{\text{DS}} \leq -5\text{ V}$, $V_{\text{GS}} = -4.5\text{ V}$	- 20			A
Drain-Source On-Resistance ^a	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -4.5\text{ V}$, $I_{\text{D}} = -5.3\text{ A}$		0.025	0.032	Ω
		$V_{\text{GS}} = -2.5\text{ V}$, $I_{\text{D}} = -4.6\text{ A}$		0.033	0.042	
		$V_{\text{GS}} = -1.8\text{ V}$, $I_{\text{D}} = -2.0\text{ A}$		0.046	0.059	
Forward Transconductance ^a	g_{fs}	$V_{\text{DS}} = -5\text{ V}$, $I_{\text{D}} = -5.3\text{ A}$		17		S
Diode Forward Voltage	V_{SD}	$I_{\text{S}} = -1.0\text{ A}$, $V_{\text{GS}} = 0\text{ V}$		- 0.7	- 1.2	V
Dynamic ^b						
Total Gate Charge	Q_{g}	$V_{\text{DS}} = -6\text{ V}$, $V_{\text{GS}} = -4.5\text{ V}$ $I_{\text{D}} \cong -5.3\text{ A}$		11.5	18	nC
Gate-Source Charge	Q_{gs}			1.5		
Gate-Drain Charge	Q_{gd}			3.2		
Input Capacitance	C_{iss}	$V_{\text{DS}} = -6\text{ V}$, $V_{\text{GS}} = 0\text{ V}$, $f = 1\text{ MHz}$		1100		pF
Output Capacitance	C_{oss}			390		
Reverse Transfer Capacitance	C_{rss}			300		
Switching ^c						
Turn-On Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -6\text{ V}$, $R_{\text{L}} = 6\text{ }\Omega$ $I_{\text{D}} \cong -1.0\text{ A}$, $V_{\text{GEN}} = -4.5\text{ V}$ $R_{\text{G}} = 6\text{ }\Omega$		25	40	ns
	t_{r}			45	70	
Turn-Off Time	$t_{\text{d}(\text{off})}$			72	110	
	t_{f}			60	90	

Notes:

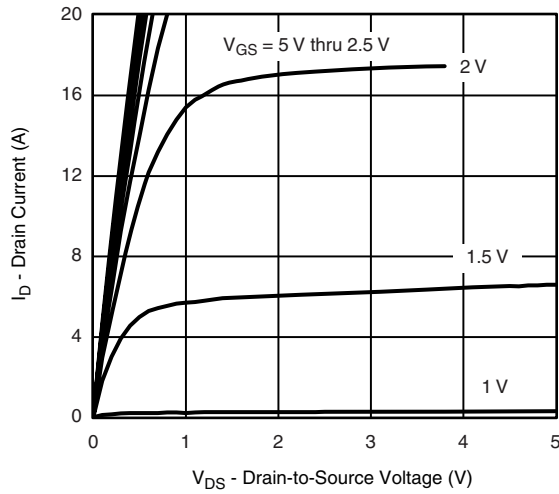
a. Pulse test: $PW \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. For design aid only, not subject to production testing.

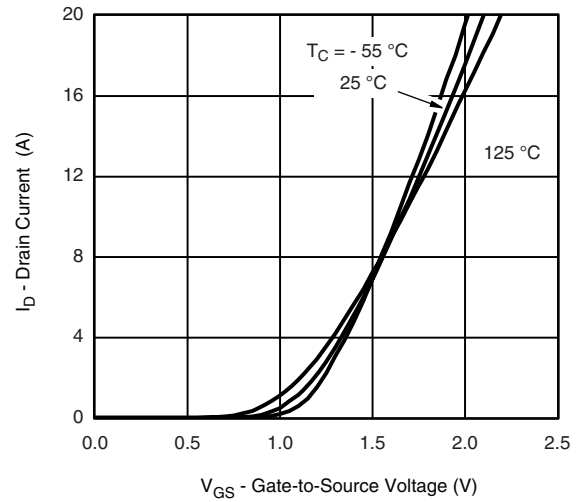
c. Switching time is essentially independent of operating temperature.

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.

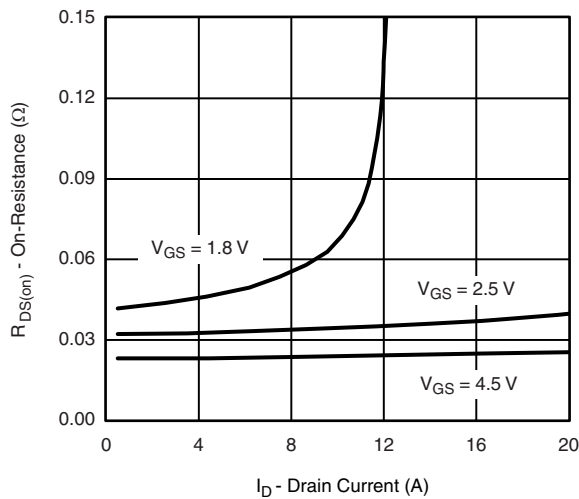
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



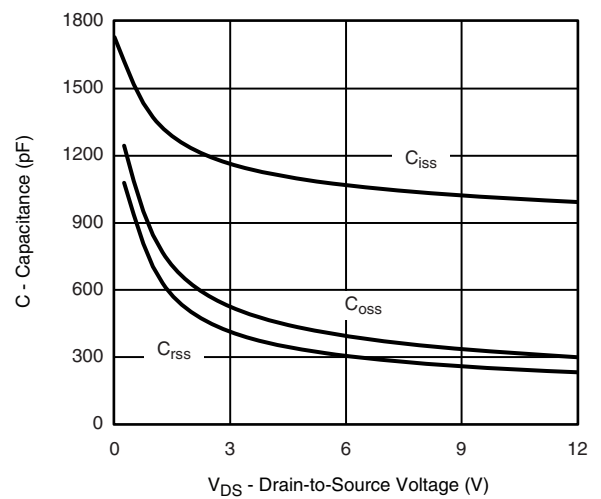
Output Characteristics



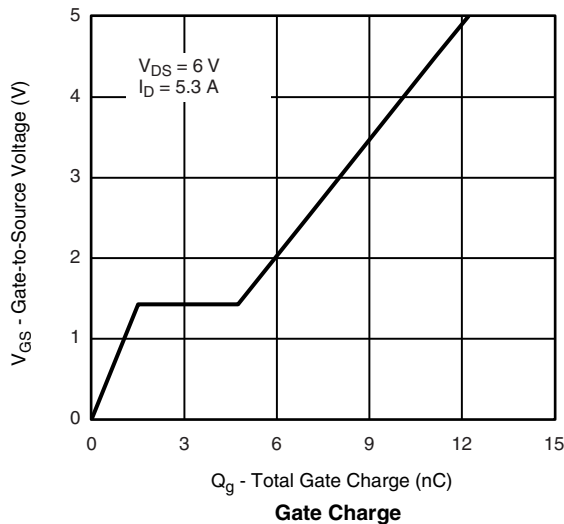
Transfer Characteristics



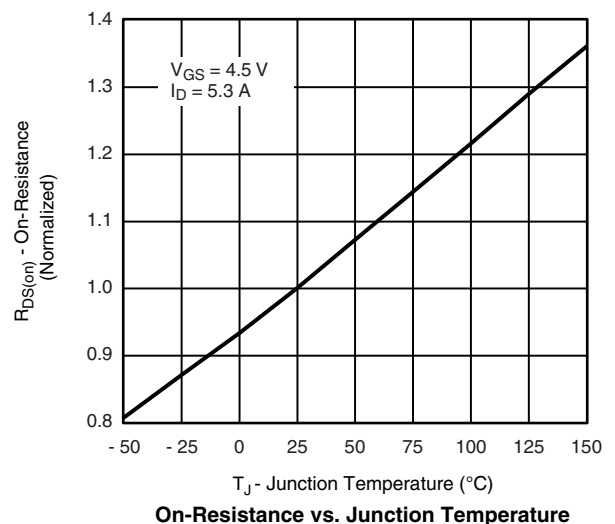
On-Resistance vs. Drain Current



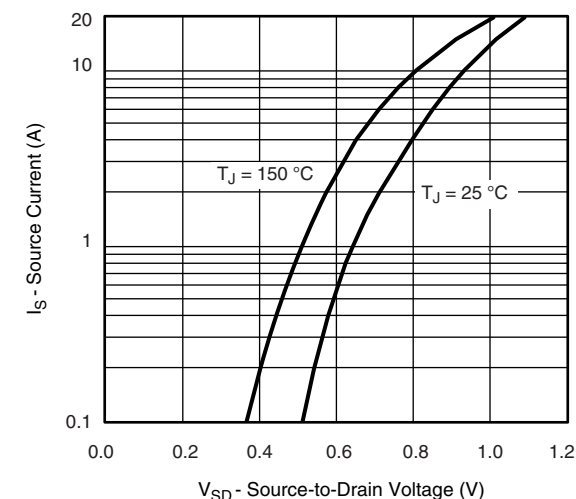
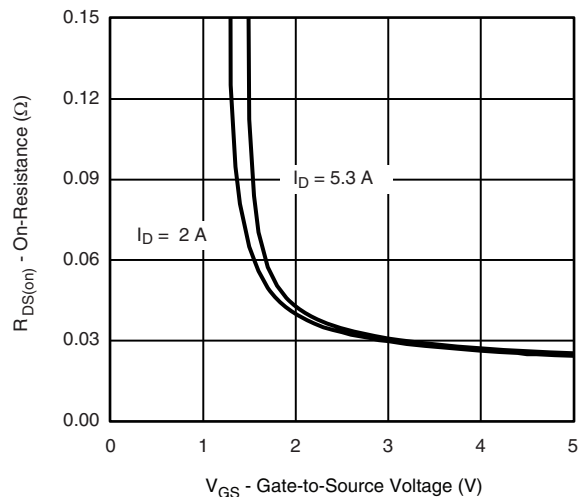
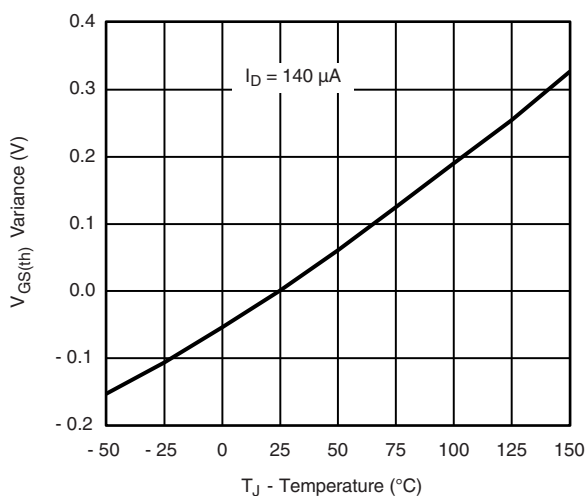
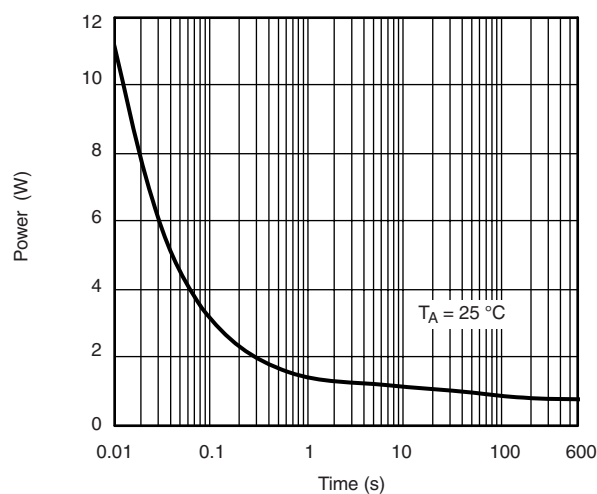
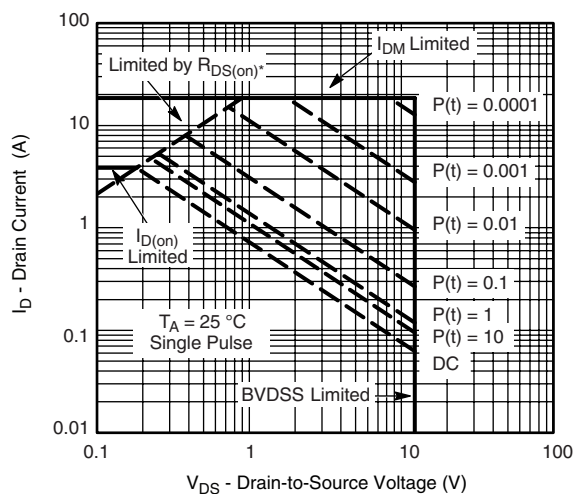
Capacitance



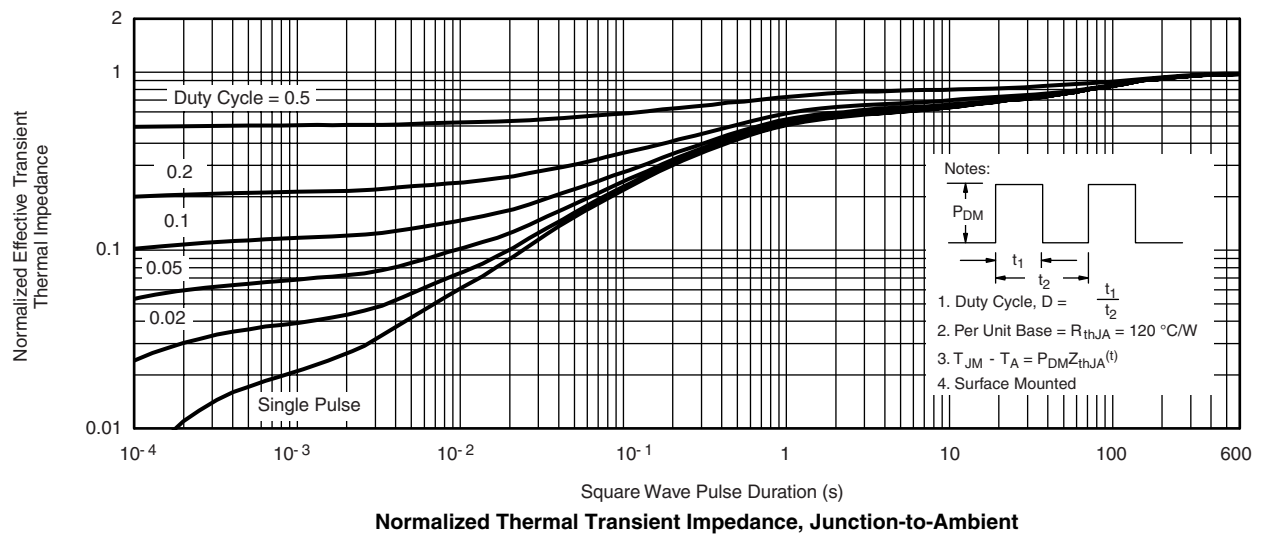
Gate Charge



On-Resistance vs. Junction Temperature

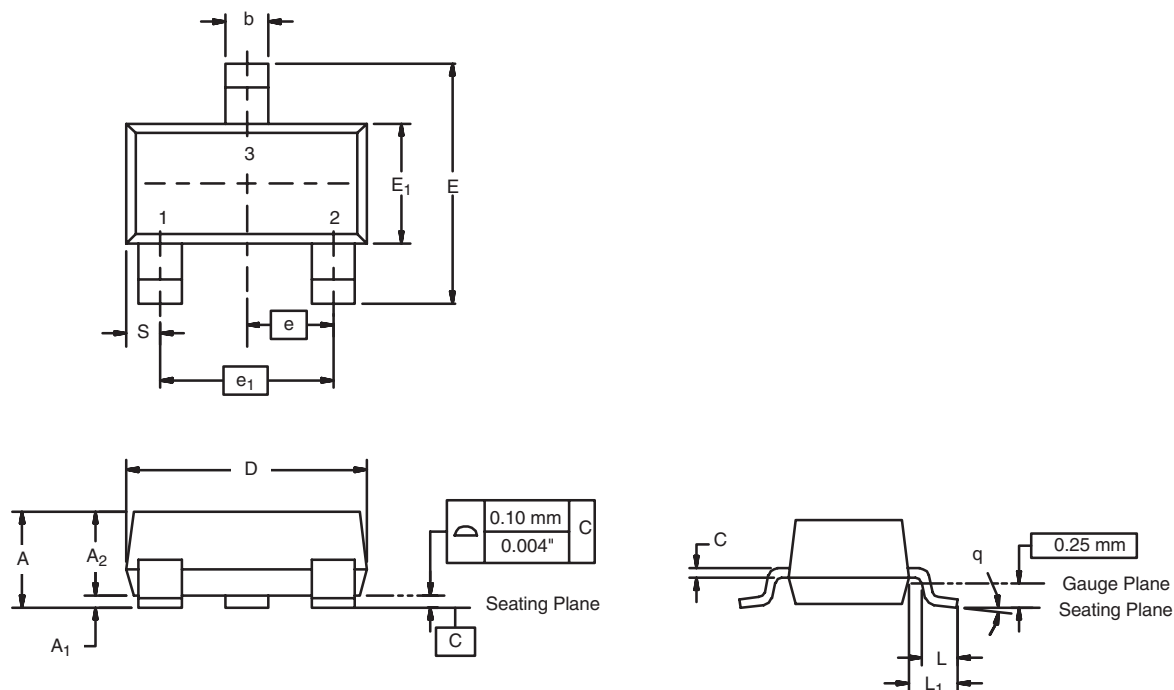
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power*** V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area**

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



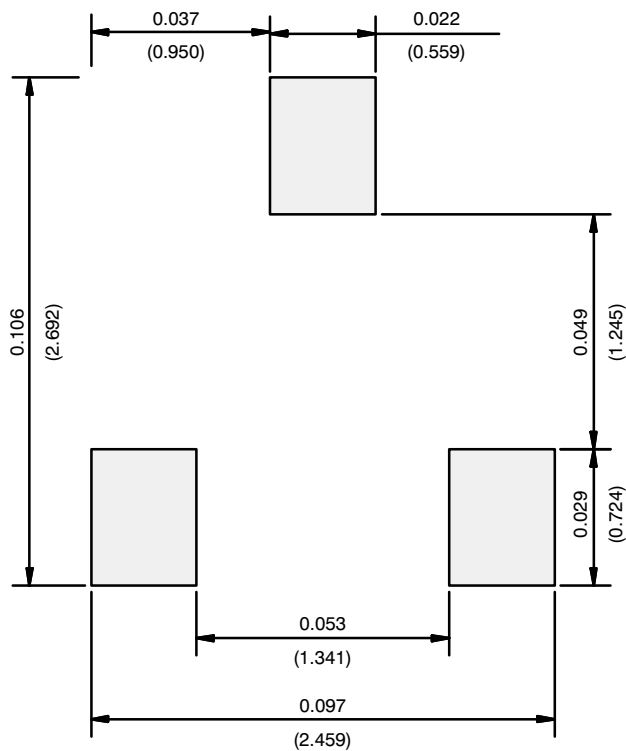
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SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A ₁	0.01	0.10	0.0004	0.004
A ₂	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E ₁	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e ₁	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L ₁	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°
ECN: S-03946-Rev. K, 09-Jul-01				
DWG: 5479				

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

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