

SuperMOS – SOT-23 -12V V_{DSS} , 29m Ω $R_{DS(on)}$, P-channel MOSFET

1. Description

The SI2333-ES is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product SI2333-ES is Pb-free.

2. Features

- -12V, $R_{DS(ON)}$ =29m Ω (TYP.) @ V_{GS} =-4.5V
- $R_{DS(ON)}$ =45m Ω (TYP.) @ V_{GS} =-2.5V
- $R_{DS(ON)}$ =67m Ω (TYP.) @ V_{GS} =-1.8V
- Fast Switching
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

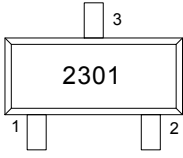
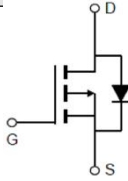
3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
SI2333-ES	SOT-23	2301	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	BV_{DSS}	-12	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	$T_A=25^\circ\text{C}$	-3.8	A
	$T_A=100^\circ\text{C}$	-2.3	
Maximum Power Dissipation	$T_A=25^\circ\text{C}$	1.2	W
Pulsed Drain Current	I_{DM}	-15	A
Operating Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{stg}	-55 to +150	°C

Thermal resistance ratings

Single Operation				
Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ($t \leq 10\text{s}$)	$R_{\theta JA}$		104	°C/W

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-12			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-12V, V_{GS}=0V$			-1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.4	-0.62	-1.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-3.8A$		29	36	m Ω
		$V_{GS}=-2.5A, I_D=-3A$		45	60	
		$V_{GS}=-1.8V, I_D=-2.5A$		67	84	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=-6V$ $f=1MHz$		500		pF
Output Capacitance	C_{OSS}			118		
Reverse Transfer Capacitance	C_{RSS}			101		
Total Gate Charge	Q_G	$V_{GS}=-4.5V, V_{DS}=-6V$ $I_D=-3.8A$		8.5		nC
Gate-to-Source Charge	Q_{GS}			1.5		
Gate-to-Drain Charge	Q_{GD}			2.6		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=-4.5V, V_{DS}=-6V$ $I_D=-3.8A, R_G=3\Omega$		6		ns
Rise Time	t_r			35		
Turn-Off Delay Time	$t_{d(OFF)}$			50		
Fall Time	t_f			52		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-3.8A$			-1.5	V

7. Typical Characteristics

Figure 1: Output Characteristics

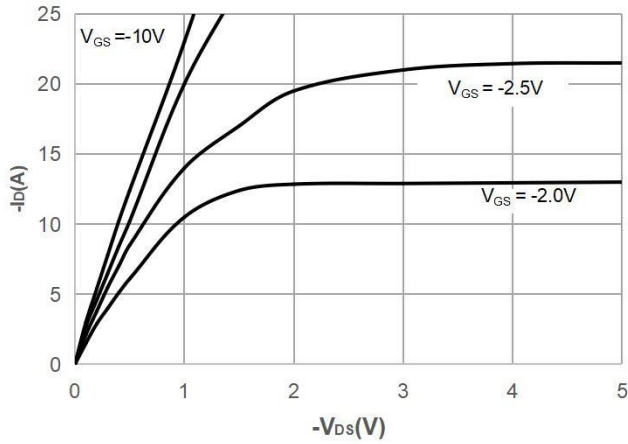


Figure 2: Typical Transfer Characteristics

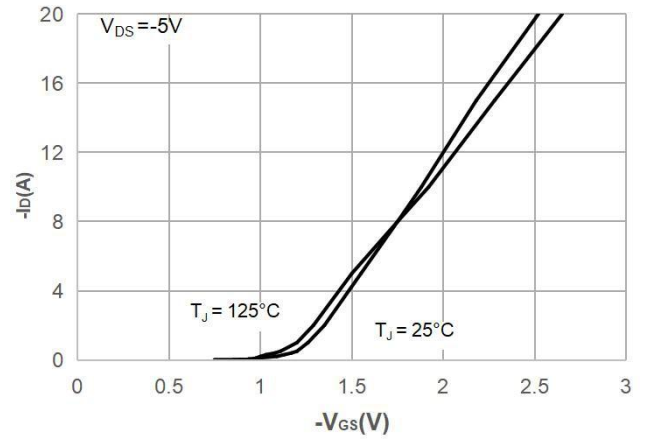


Figure 3: On-resistance vs. Drain Current

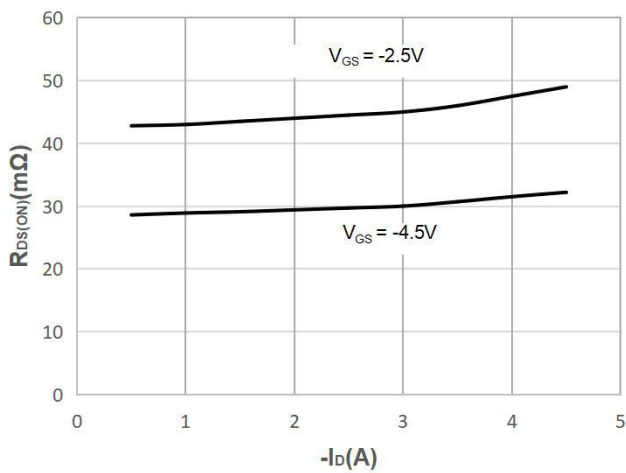


Figure 4: Body Diode Characteristics

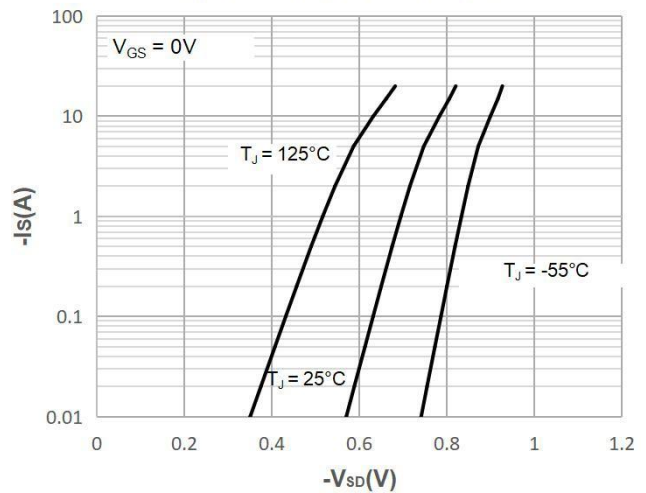


Figure 5: Gate Charge Characteristics

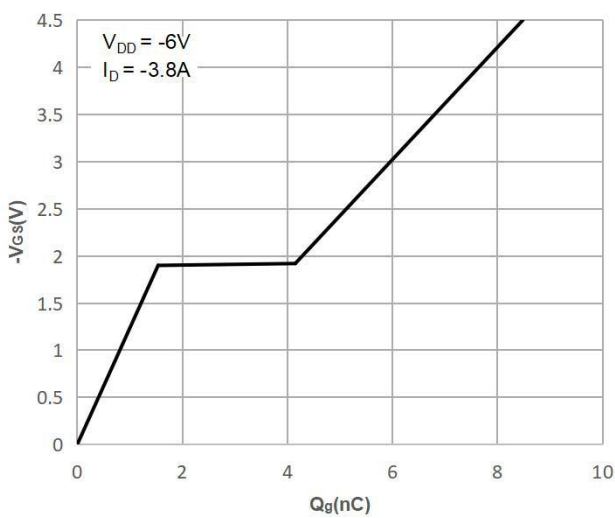


Figure 6: Capacitance Characteristics

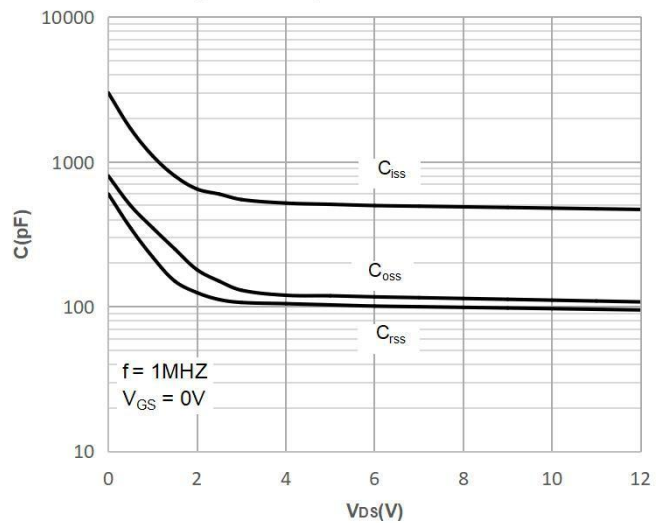


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

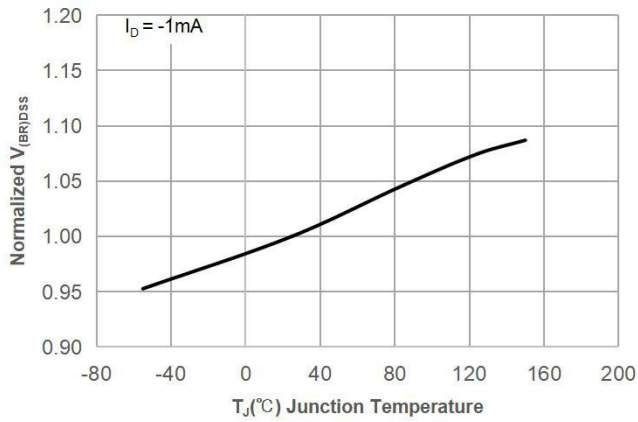


Figure 8: Normalized on Resistance vs. Junction Temperature

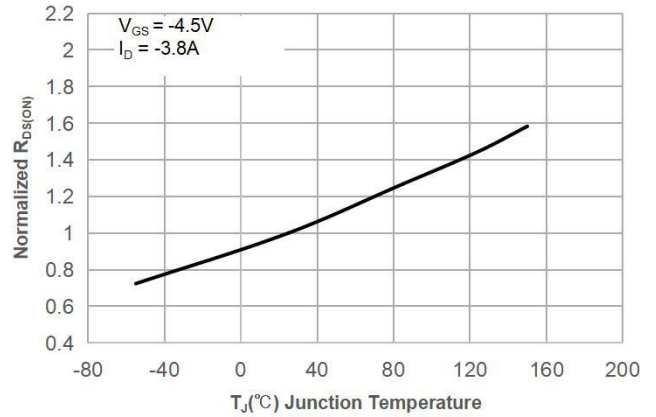


Figure 9: Maximum Safe Operating Area

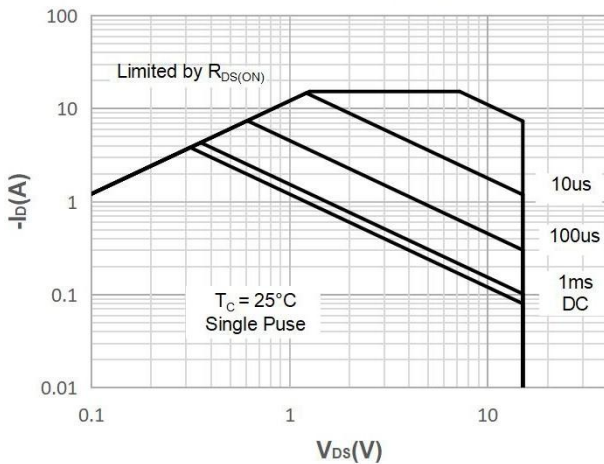


Figure 10: Maximum Continuous Driain Current vs. Case Temperature

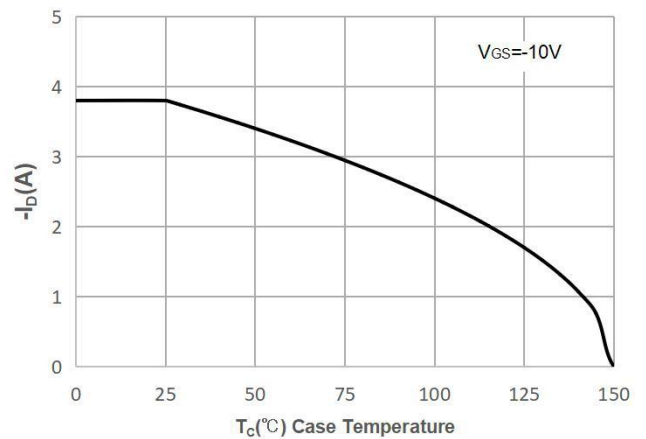


Figure 11: Normalized Maximum Transient Thermal Impedance

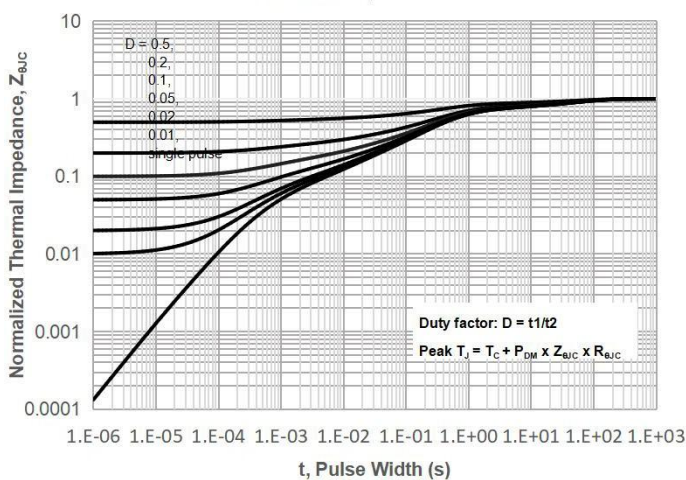
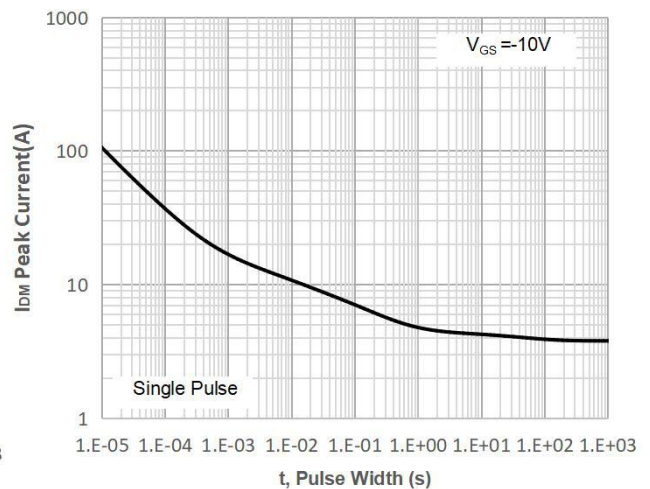
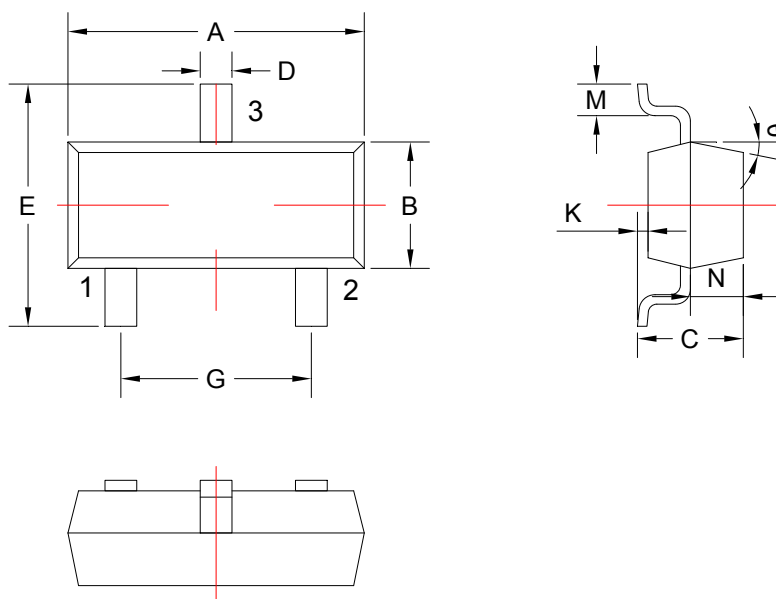


Figure 12: Peak Current Capacity



8. Dimension (SOT-23)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER					
SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	2.85	3.04	G	1.80	2.00
B	1.20	1.40	K	0	0.10
C	0.90	1.10	M	0.20	-
D	0.40	0.50	N	0.50	0.70
E	2.25	2.55	θ	5°	9°

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