



SI2312CDS

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^e	Q _g (Typ.)
20	0.0318 at V _{GS} = 4.5 V	6 ^a	8.8 nC
	0.0356 at V _{GS} = 2.5 V	6 ^a	
	0.0414 at V _{GS} = 1.8 V	5.6	

FEATURES

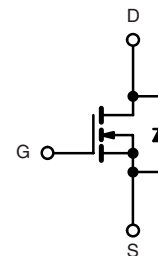
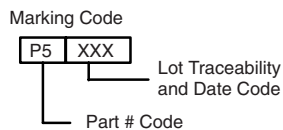
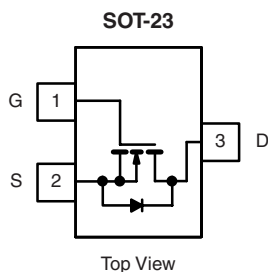
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- DC/DC Converters
- Load Switch for Portable Applications



Ordering Information: SI2312CDS-T1-GE3 (Lead (Pb)-free and Halogen-free)

N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	20	V
Gate-Source Voltage	V _{GS}	± 8	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	6 ^a	A
	T _C = 70 °C	5.1	
	T _A = 25 °C	5 ^{b, c}	
	T _A = 70 °C	4 ^{b, c}	
Pulsed Drain Current	I _{DM}	20	
Continuous Source-Drain Diode Current	T _C = 25 °C	1.75	
	T _A = 25 °C	1.04 ^{b, c}	
Maximum Power Dissipation	T _C = 25 °C	2.1	W
	T _C = 70 °C	1.3	
	T _A = 25 °C	1.25 ^{b, c}	
	T _A = 70 °C	0.8 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)		260	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	t ≤ 5 s	R _{thJA}	80	100	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	40	60	

Notes:

- Package limited
- Surface Mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 125 °C/W.
- Based on T_C = 25 °C.



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SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		25		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-2.6			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.45		1.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = 4.5\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		0.0265	0.0318	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 4.7\text{ A}$		0.0296	0.0356	
		$V_{GS} = 1.8\text{ V}, I_D = 4.3\text{ A}$		0.0345	0.0414	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 5.0\text{ A}$		24		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		865		pF
Output Capacitance	C_{oss}		105			
Reverse Transfer Capacitance	C_{rss}		55			
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 5\text{ V}, I_D = 5.0\text{ A}$		12	18	nC
		$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.0\text{ A}$		8.8	14	
Gate-Source Charge	Q_{gs}		1.1			
Gate-Drain Charge	Q_{gd}		0.7			
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.5	2.4	4.8	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.2\text{ }\Omega$ $I_D \cong 4\text{ A}, V_{GEN} = 4.5\text{ V}, R_g = 1\text{ }\Omega$		8	16	ns
Rise Time	t_r		17	26		
Turn-Off Delay Time	$t_{d(off)}$		31	47		
Fall Time	t_f		8	16		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 2.2\text{ }\Omega$ $I_D \cong 4\text{ A}, V_{GEN} = 5\text{ V}, R_g = 1\text{ }\Omega$		5	10	
Rise Time	t_r		13	20		
Turn-Off Delay Time	$t_{d(off)}$		21	32		
Fall Time	t_f		6	12		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			1.75	A
Pulse Diode Forward Current	I_{SM}				20	
Body Diode Voltage	V_{SD}	$I_S = 4\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 4\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		12	20	ns
Body Diode Reverse Recovery Charge	Q_{rr}		5	10	nC	
Reverse Recovery Fall Time	t_a		7		ns	
Reverse Recovery Rise Time	t_b		5			

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.