

SPN2304S23RGB-VB Datasheet

N-Channel 30-V (D-S) MOSFET

PRODUC	CT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
30	0.030 at V _{GS} = 10 V	6.5	4.5 nC
30	0.033 at V _{GS} = 4.5 V	6.0	4.5 110

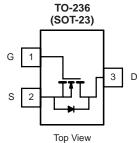
FEATURES

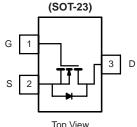
- Halogen-free According to IEC 61249-2-21 ٠ Definition
- Trench Power MOSFET
- 100 % Rg Tested
- Compliant to RoHS Directive 2002/95/EC ٠

APPLICATIONS

DC/DC Converter







S N-Channel MOSFET

GC

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V _{DS}	30	V
Gate-Source Voltage		V _{GS}	± 20	v
Continuous Drain Current (T ₁ = 150 °C)	T _C = 25 °C		6.5 ^a	
	T _C = 70 °C		6.0	
	T _A = 25 °C	טי	5.3	
	T _A = 70 °C	1	5.0	A
Pulsed Drain Current		I _{DM}	25	
	T _C = 25 °C		1.4	
Continuous Source-Drain Diode Current	T _A = 25 °C	I _S	0.9 ^{b, c}	
	T _C = 25 °C		1.7	
Maximum Power Dissipation	T _C = 70 °C	P _D	1.1	w
	T _A = 25 °C		1.1 ^{b, c}	VV
	T _A = 70 °C	1	0.7 ^{b, c}	
Operating Junction and Storage Temperature	e Range	T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Tempera	ature) ^{d, e}		260	

THERMAL RESISTANCE RA	TINGS				
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	t ≤ 5 s	R _{thJA}	90	115	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	60	75	0/11

Notes:

a. Package limited

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

c. t = 5 s.

d. Maximum under steady state conditions is 130 °C/W.

SPECIFICATIONS $T_J = 25 \text{ °C},$	unless othe	rwise noted				
Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 V, I_{D} = 250 \mu A$	30			V
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I _D = 250 μA		31		mV/°C
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}\!/T_J$	1 <u>0</u> – 200 µ. (- 5		
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $I_D = 250 \ \mu A$	0.7	1.1	2.0	V
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA
Zara Gata Valtaga Drain Current	lace	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$			1	
Zero Gate Voltage Drain Current	IDSS	V_{DS} = 30 V, V_{GS} = 0 V, T_{J} = 55 °C			10	μA
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 V$, $V_{GS} = 10 V$	10			А
	Б	$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 3.2 \text{ A}$		0.030		0
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = 4.5 \text{ V}, I_{D} = 2.8 \text{ A}$		0.033		Ω
Forward Transconductance ^a	9 _{fs}	V _{DS} = 15 V, I _D = 4.8 A		11		S
Dynamic ^b	<u> </u>			<u>1</u>	I	I
Input Capacitance	C _{iss}			335		
Output Capacitance	C _{oss}	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		45		рF
Reverse Transfer Capacitance	C _{rss}			17		
Table Oats Observe	0	V_{DS} = 15 V, V_{GS} = 10 V, I_{D} = 3.4 A		4.5	6.7	
Total Gate Charge	Qg			2.1	3.2	nC
Gate-Source Charge	Q _{gs}	V_{DS} = 15 V, V_{GS} = 4.5 V, I_{D} = 3.4 A		0.85		
Gate-Drain Charge	Q _{gd}			0.65		1
Gate Resistance	Rg	f = 1 MHz	0.8	4.4	8.8	Ω
Turn-On Delay Time	t _{d(on)}			12	20	
Rise Time	t _r	V_{DD} = 15 V, R_L = 5.6 Ω		50	75	
Turn-Off Delay Time	t _{d(off)}	$\text{I}_\text{D}{\cong}2.7$ A, V_GEN = 4.5 V, R_g = 1 Ω		12	20	
Fall Time	t _f			22	35	
Turn-On Delay Time	t _{d(on)}			5	10	ns
Rise Time	t _r	V_{DD} = 15 V, R_L = 5.6 Ω		12	20	1
Turn-Off Delay Time	t _{d(off)}	$I_D\widetilde{=}2.7$ A, V_{GEN} = 10 V, R_g = 1 Ω		10	15	1
Fall Time	t _f			5	10	1
Drain-Source Body Diode Characteristic	s					
Continuous Source-Drain Diode Current	ا _S	T _C = 25 °C			1.4	^
Pulse Diode Forward Current	I _{SM}				15	A
Body Diode Voltage	V _{SD}	$I_{S} = 2.7 \text{ A}, V_{GS} = 0 \text{ V}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}			10	20	ns
Body Diode Reverse Recovery Charge	Q _{rr}	L = 2.7 A dl/dt = 100 A/up T = 25 °C		5	10	nC
Reverse Recovery Fall Time	ta	$I_F = 2.7 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, \text{ T}_J = 25 ^\circ\text{C}$		6		
Reverse Recovery Rise Time	t _b			4		ns

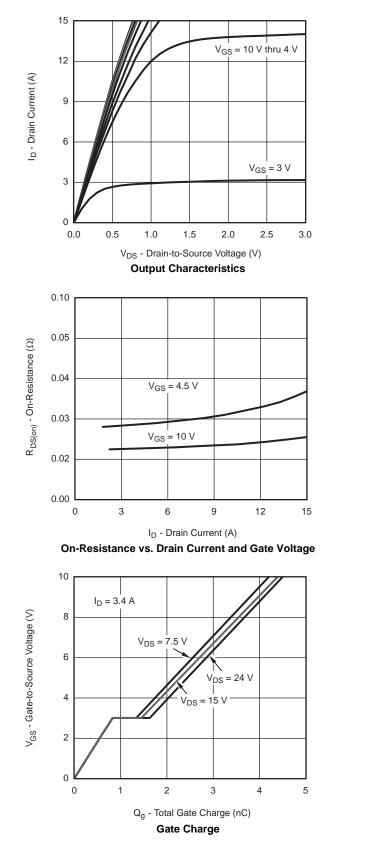
a. Pulse test; pulse width \leq 300 $\mu s,$ duty cycle \leq 2 %

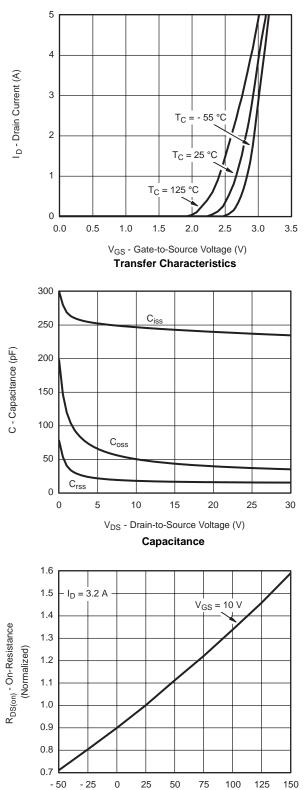
b. Guaranteed by design, not subject to production testing.

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.

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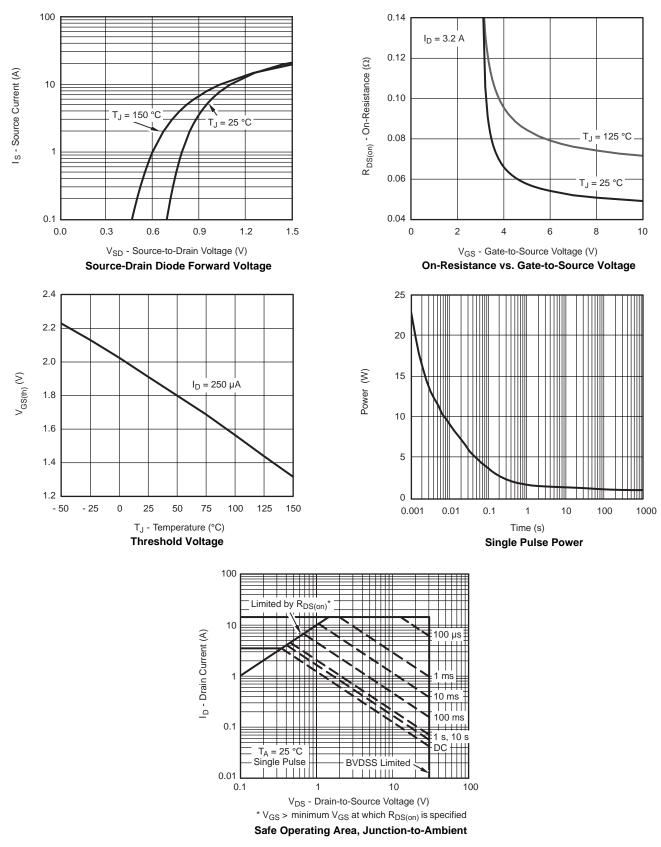




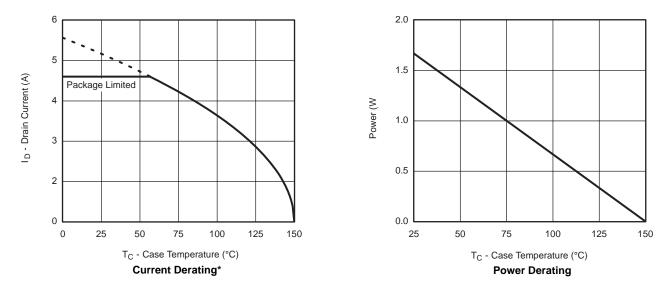


T_J - Junction Temperature (°C) On-Resistance vs. Junction Temperature



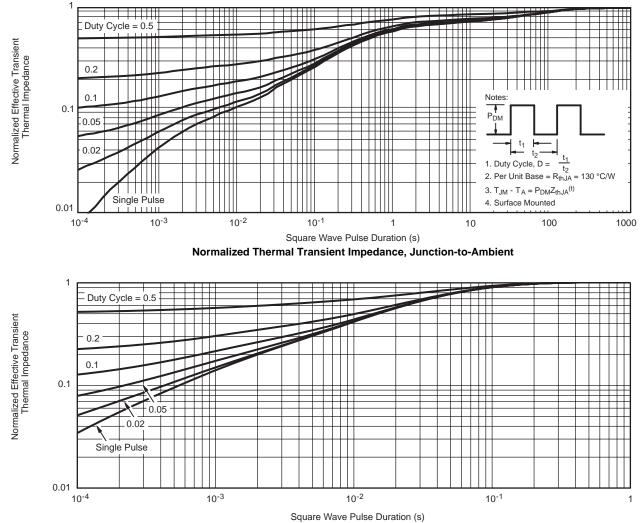






* The power dissipation P_D is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



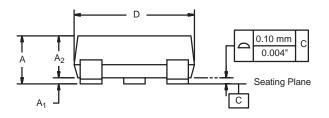


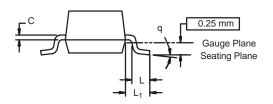
Normalized Thermal Transient Impedance, Junction-to-Foot



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







Max 1.12 0.10 1.02 0.50 0.18 3.04 2.64 1.40	Min 0.035 0.0004 0.0346 0.014 0.003 0.110 0.083	Max 0.044 0.004 0.040 0.020 0.007 0.120 0.104		
0.10 1.02 0.50 0.18 3.04 2.64	0.0004 0.0346 0.014 0.003 0.110 0.083	0.004 0.040 0.020 0.007 0.120		
1.02 0.50 0.18 3.04 2.64	0.0346 0.014 0.003 0.110 0.083	0.040 0.020 0.007 0.120		
0.50 0.18 3.04 2.64	0.014 0.003 0.110 0.083	0.020 0.007 0.120		
0.18 3.04 2.64	0.003 0.110 0.083	0.007 0.120		
3.04 2.64	0.110 0.083	0.120		
2.64	0.083			
		0.104		
1 40				
1.40	0.047	0.055		
BSC	0.0374	1 Ref		
1.90 BSC		0.0748 Ref		
0.60	0.016	0.024		
Ref	0.025	Ref		
Ref	0.020	Ref		
8°	3°	8°		
	4 Ref D Ref 8°	0.020 Ref 0.020		

SPN2304S23RGB-VB



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)

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