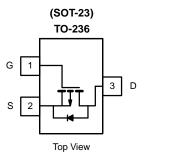
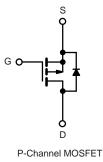


## ST2005SRG-VB Datasheet

# P-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY					
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω) Typ.	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)		
	0.046 at V <sub>GS</sub> = - 10 V	- 5.6			
- 30	0.049 at V <sub>GS</sub> = - 6 V	- 5	11.4 nC		
	0.054 at V <sub>GS</sub> = - 4.5 V	-4.5			





#### **FEATURES**

- TrenchFET<sup>®</sup> Power MOSFET
- 100 % R<sub>g</sub> Tested



#### **APPLICATIONS**

- For Mobile Computing
  - Load Switch
  - Notebook Adaptor Switch
  - DC/DC Converter

Parameter		Symbol	Limit	Unit	
Drain-Source Voltage		V <sub>DS</sub>	- 30	N/	
Gate-Source Voltage		V <sub>GS</sub>	± 20	V	
	T <sub>C</sub> = 25 °C		- 5.6		
Continuous Drain Current (T. 150 °C)	T <sub>C</sub> = 70 °C		- 5.1		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	T <sub>A</sub> = 25 °C	I <sub>D</sub>	- 5.4 <sup>b,c</sup>		
	T <sub>A</sub> = 70 °C		- 4.3 <sup>b,c</sup>	А	
Pulsed Drain Current (t = 100 µs)		I <sub>DM</sub>	- 18		
	T <sub>C</sub> = 25 °C		- 2.1		
Continous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	- 1 <sup>b,c</sup>		
	T <sub>C</sub> = 25 °C		2.5		
Maximum Power Dissipation	T <sub>C</sub> = 70 °C		1.6	14/	
	T <sub>A</sub> = 25 °C	P <sub>D</sub>	1.25 <sup>b,c</sup>	W	
	T <sub>A</sub> = 70 °C	1	0.8 <sup>b,c</sup>		
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C	

#### THERMAL RESISTANCE RATINGS Parameter Symbol Typical Maximum Maximum Junction-to-Ambient<sup>b,d</sup> $t \le 5 s$ $\mathsf{R}_{\mathsf{thJA}}$ 75 100 40 Maximum Junction-to-Foot (Drain) 50 Steady State $\mathsf{R}_{\mathsf{thJF}}$

Notes:

a. Based on  $T_C = 25 \text{ °C}$ . b. Surface mounted on 1" x 1" FR4 board.

c. t = 5 s.

d. Maximum under steady state conditions is 166 °C/W.

Unit

°C/W

5	3	®	Bs	sem	ni
W١	ww.\	/Bs	em	i.co	m

Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static		·		•	•		
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0 V, I_D = -250 \mu A$	- 30			V	
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	Ι <sub>D</sub> = - 250 μΑ		- 19		mV/°C	
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	i <sub>D</sub> = - 250 μA		4			
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_{D} = -250 \ \mu A$	- 0.5		- 2.0	V	
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA	
Zene Oole Malle en Deris Orment		$V_{DS} = -30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			- 1	μA	
Zero Gate Voltage Drain Current	IDSS	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			- 5		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \le -5 V$ , $V_{GS} = -10 V$	- 2.5			Α	
	( )	V <sub>GS</sub> =- 10 V, I <sub>D</sub> = - 4.4 A		0.046			
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =- 6 V, I <sub>D</sub> = - 4 A		0.049		Ω	
	- ( - )	V <sub>GS</sub> =- 4.5 V, I <sub>D</sub> = - 3.6 A		0.054			
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 3.4 A		18		S	
Dynamic <sup>b</sup>		· · · · ·		1	Į	ļ	
Input Capacitance	C <sub>iss</sub>			1295		1	
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		150		pF	
Reverse Transfer Capacitance	C <sub>rss</sub>			130			
		V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 5.4 A		24	36		
Total Gate Charge	Qg			11.4	17	nC	
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 5.4 A		3.4			
Gate-Drain Charge	Q <sub>gd</sub>			3.8			
Gate Resistance	R <sub>g</sub>	f = 1 MHz	1.5	7.7	15.4	Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			13	20		
Rise Time	t <sub>r</sub>	V <sub>DD</sub> = - 15 V, R <sub>I</sub> = 3.5 Ω		4	8		
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ - 4.3 A, $V_{GEN}$ = - 10 V, $R_q$ = 1 $\Omega$		38	57	-	
Fall Time	t <sub>f</sub>			6	12		
Turn-On Delay Time	t <sub>d(on)</sub>			28	42	ns	
Rise Time	t <sub>r</sub>	V <sub>DD</sub> = - 15 V, R <sub>I</sub> = 3.5 Ω		16	24	-	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ - 4.3 A, $V_{GEN}$ = - 4.5 V, $R_q$ = 1 $\Omega$		30	45		
Fall Time	t <sub>f</sub>			10	20		
Drain-Source Body Diode Characteristic	•	I			-	I	
Continuous Source-Drain Diode Current	۱ <sub>S</sub>	T <sub>C</sub> = 25 °C			- 2.1		
Pulse Diode Forward Current (t = 100 µs)	I <sub>SM</sub>				- 80	A	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 4.3 A, V <sub>GS</sub> = 0 V		- 0.8	- 1.2	V	
Body Diode Reverse Recovery Time	t <sub>rr</sub>			15	23	ns	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			7	14	nC	
Reverse Recovery Fall Time	ta	I <sub>F</sub> = - 4.3 A, dl/dt = 100 A/µs, T <sub>J</sub> = 25 °C		8			
Reverse Recovery Rise Time	t <sub>b</sub>			7		ns	

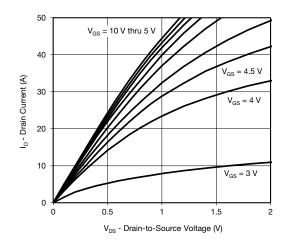
Notes:

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

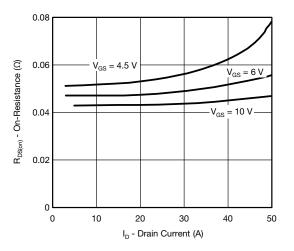
b. Guaranteed by design, not subject to production testing.

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.

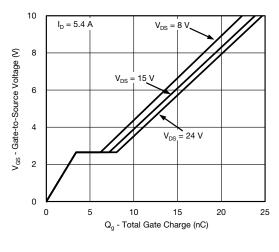




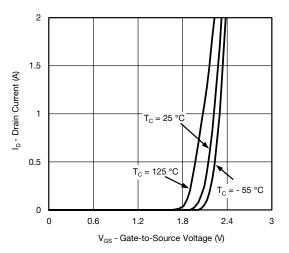




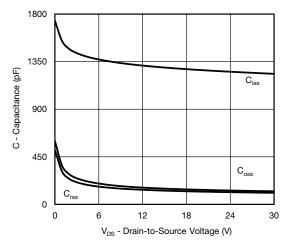
**On-Resistance vs. Drain Current** 



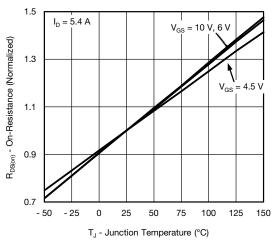
**Gate Charge** 



**Transfer Characteristics** 

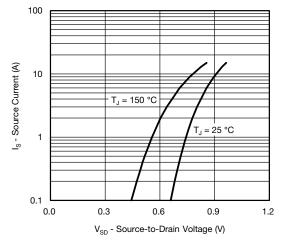


Capacitance



**On-Resistance vs. Junction Temperature** 

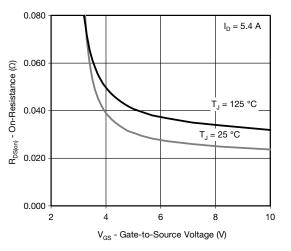




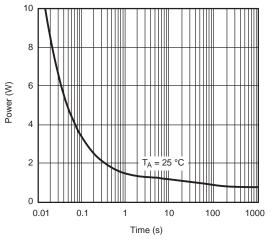




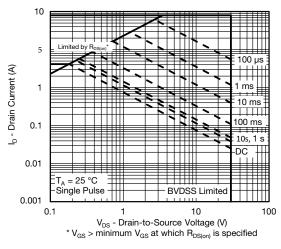
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage

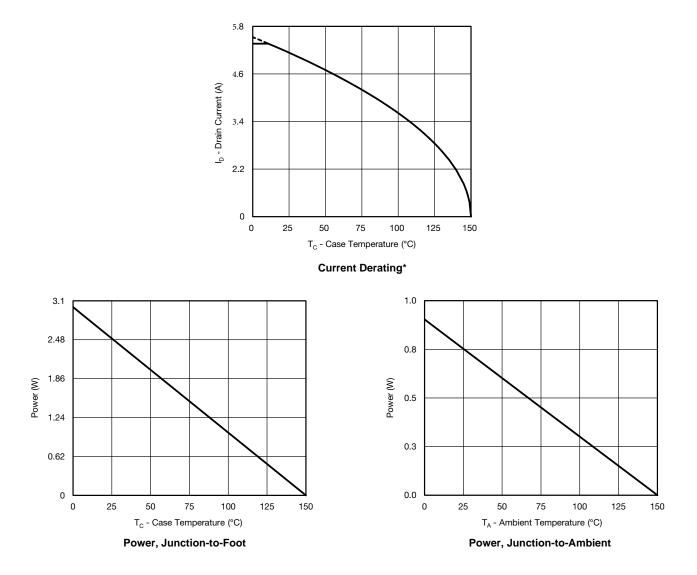


Single Pulse Power (Junction-to-Ambient)



Safe Operating Area, Junction-to-Ambient





\* 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-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



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







Dim	MILLIMETERS		INCHES		
	Min	Max	Min	Мах	
Α	0.89	1.12	0.035	0.044	
A <sub>1</sub>	0.01	0.10	0.0004	0.004	
A <sub>2</sub>	0.88	1.02	0.0346	0.040	
b	0.35	0.50	0.014	0.020	
С	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 <sub>1</sub>	1.20	1.40	0.047	0.055	
е	0.95 BSC		0.0374 Ref		
e <sub>1</sub>	1.90 BSC		0.0748 Ref		
L	0.40	0.60	0.016	0.024	
L <sub>1</sub>	0.64 Ref		0.025 Ref		
S	0.50 Ref		0.020 Ref		
q	3°	8°	3°	8°	



#### **RECOMMENDED MINIMUM PADS FOR SOT-23**



Recommended Minimum Pads Dimensions in Inches/(mm)



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