

ELM13410CA-VB Datasheet

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

PRODUCT 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	4.5110			

FEATURES

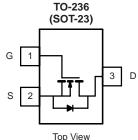
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % Rg Tested
- Compliant to RoHS Directive 2002/95/EC

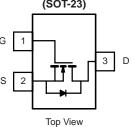
N-Channel MOSFET

APPLICATIONS

DC/DC Converter







ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted Parameter Symbol Limit Unit 30 **Drain-Source Voltage** V_{DS} V Gate-Source Voltage V_{GS} ± 20 T_C = 25 °C 6.5^a T_C = 70 °C 6.0 Continuous Drain Current (T_J = 150 °C) I_D T_A = 25 °C 5.3 $T_A = 70 \degree C$ А 5.0 Pulsed Drain Current I_{DM} 25 T_C = 25 °C 1.4 Continuous Source-Drain Diode Current Is T_A = 25 °C 0.9^{b, c} T_C = 25 °C 1.7 T_C = 70 °C 1.1 Maximum Power Dissipation P_D W T_A = 25 °C <u>1.</u>1^{b, c} 0.7^{b, c} T_A = 70 °C Operating Junction and Storage Temperature Range T_J, T_{stg} - 55 to 150 °C Soldering Recommendations (Peak Temperature)^{d, e} 260

THERMAL RESISTANCE RATINGS					
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	

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 $T_J = 25 \degree C$,				-			
Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static	N			1			
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	$\Delta V_{GS(th)}\!/T_J$			- 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	
Zero Gate Voltage Drain Current	I _{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			1	μA	
Zero Gale voltage Drain Gurrent	'DSS	V_{DS} = 30 V, V_{GS} = 0 V, T_{J} = 55 °C			10		
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 \text{ V}, \text{ V}_{GS} = 10 \text{ V}$	10			Α	
	Р	V _{GS} = 10 V, I _D = 3.2 A		0.030			
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 2.8 \text{ A}$		0.033		Ω	
Forward Transconductance ^a	9 _{fs}	V _{DS} = 15 V, I _D = 4.8 A		11		S	
Dynamic ^b				1	1		
Input Capacitance	C _{iss}			335		pF	
Output Capacitance	C _{oss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		45			
Reverse Transfer Capacitance	C _{rss}			17			
-		V _{DS} = 15 V, V _{GS} = 10 V, I _D = 3.4 A		4.5	6.7	nC	
Total Gate Charge	Q _g			2.1	3.2		
Gate-Source Charge	Q _{gs}	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 3.4 \text{ A}$		0.85			
Gate-Drain Charge	Q _{gd}			0.65			
Gate Resistance	R _g	f = 1 MHz	0.8	4.4	8.8	Ω	
Turn-On Delay Time	t _{d(on)}			12	20		
Rise Time	t _r	$V_{DD} = 15 \text{ V}, \text{ R}_1 = 5.6 \Omega$		50	75	-	
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 2.7 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$		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	-	
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 2.7 \text{ A}, \text{ V}_{\text{GEN}} = 10 \text{ V}, \text{ R}_{\text{g}} = 1 \Omega$		10	15		
Fall Time	t _f			5	10		
Drain-Source Body Diode Characteristic	s			1	L		
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}			5	10	nC	
Reverse Recovery Fall Time	t _a	$I_F = 2.7 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, \text{ T}_J = 25 \text{ °C}$		6	-	ns	
Reverse Recovery Rise Time	t _b			4			

Notes:

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

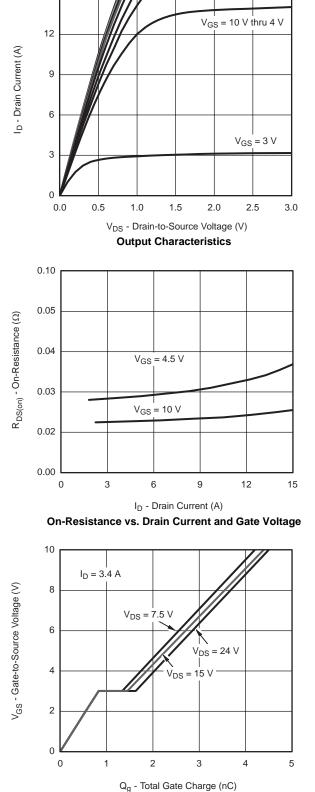
b. Guaranteed by design, not subject to production testing.

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.

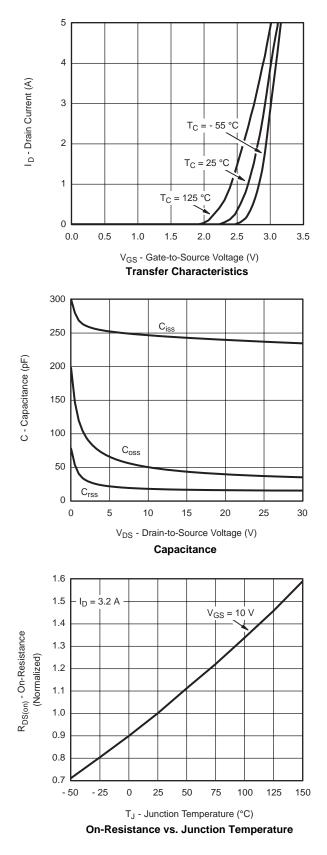
VBsemi Bsemi.com 15



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

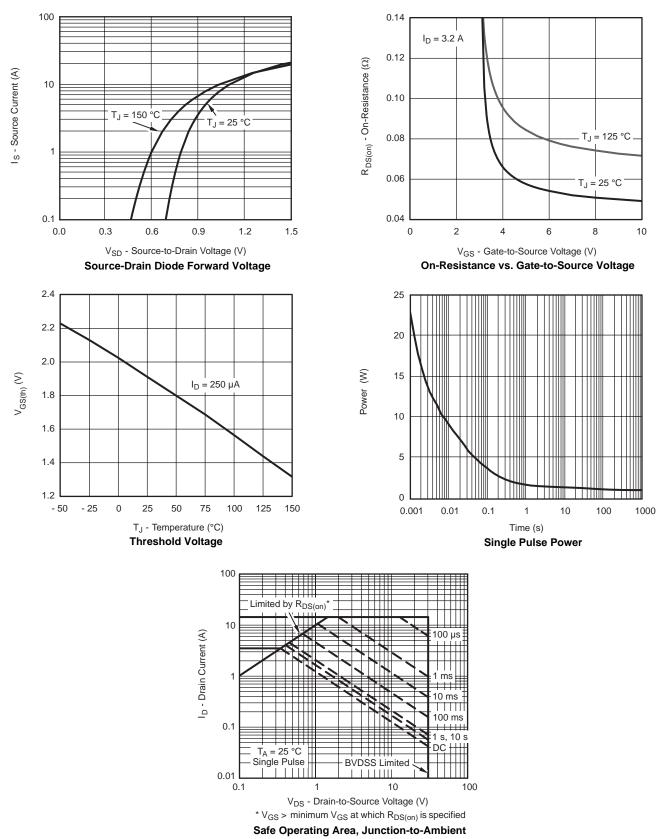


Gate Charge





TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted





6 2.0 5 1.5 I_D - Drain Current (A) Package Limited 4 Power (W 1.0 3 0.5 2 0 0.0 25 75 150 50 75 150 0 50 100 125 25 100 125 T_C - Case Temperature (°C) T_C - Case Temperature (°C) **Current Derating* Power Derating**

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

* 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.



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Foot



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







Dim	MILLIMETERS		INCHES		
	Min	Max	Min	Max	
Α	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	
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 ₁	1.20	1.40	0.047	0.055	
е	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- DWG: 5479	Jul-01				

ELM13410CA-VB



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)

Return to Index



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