

US3400-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

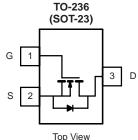
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % Rg Tested
- Compliant to RoHS Directive 2002/95/EC

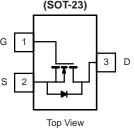
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APPLICATIONS

DC/DC Converter







N-Channel MOSFET ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted Parameter Symbol Limit Unit V_{DS} 30 **Drain-Source Voltage** 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}

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	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 otherwise 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	$\Delta V_{GS(th)}/T_J$	ημη 200 μη		- 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}	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$ $V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 55 \text{ °C}$			1 10	μA	
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 V, V_{GS} = 10 V$	10			A	
	D(01)	$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 3.2 \text{ A}$		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}	$V_{DS} = 15 \text{ V}, \text{ I}_{D} = 4.8 \text{ A}$		11		s	
Dynamic ^b	513						
Input Capacitance	C _{iss}			335			
Output Capacitance	C _{oss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		45		pF	
Reverse Transfer Capacitance	C _{rss}			17			
		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			
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 V, R ₁ = 5.6 Ω		50	75	-	
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 2.7 \text{ A}, \text{ V}_{\text{GEN}} = 4.5 \text{ V}, \text{ R}_{\text{g}} = 1 \Omega$		12	20		
Fall Time	t _f			22	35		
Turn-On Delay Time	t _{d(on)}			5	10	ns	
Rise Time	t _r	$V_{DD} = 15 \text{ V}, \text{ R}_1 = 5.6 \Omega$		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	cs				L		
Continuous Source-Drain Diode Current	۱ _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.,,			5	10	nC	
Reverse Recovery Fall Time	ta	$I_{\rm F} = 2.7$ A, dl/dt = 100 A/µs, $I_{\rm T} = 25$ °C		6			
Reverse Recovery Rise Time	t _b			4		ns	

Notes:

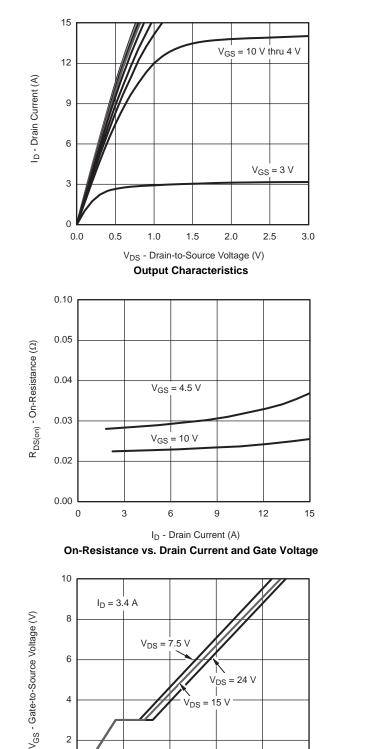
a. Pulse test; pulse width \leq 300 $\mu s,$ duty cycle \leq 2 %

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.

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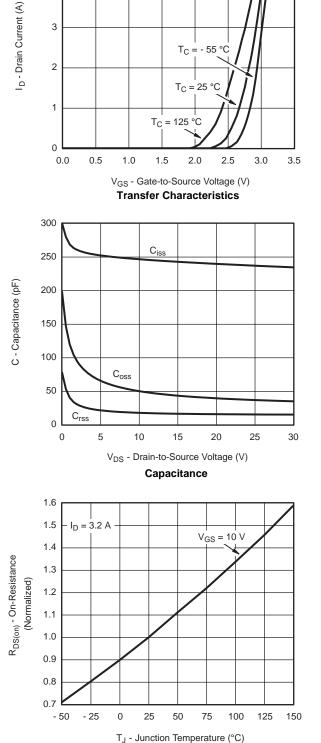




Qg - Total Gate Charge (nC)

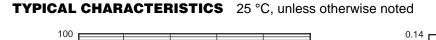
Gate Charge

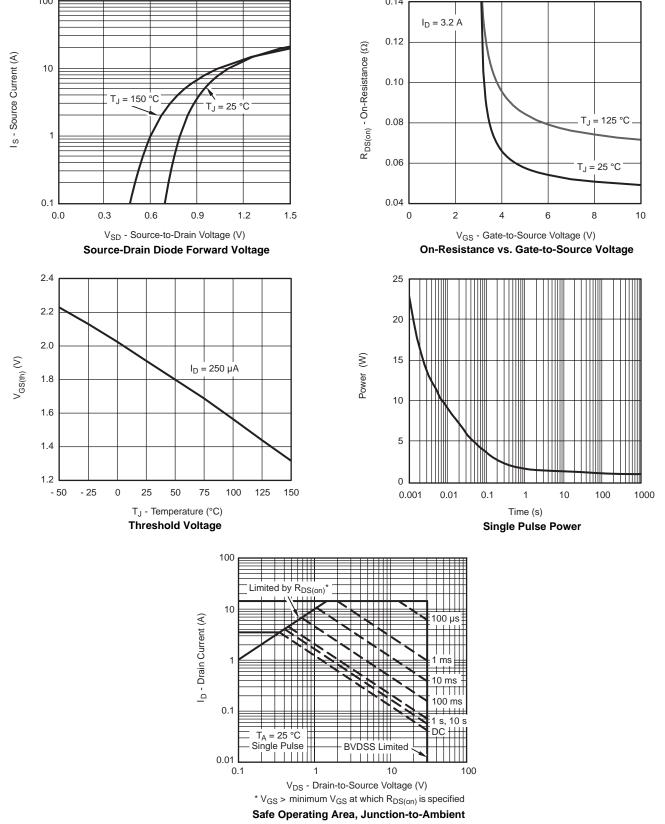
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



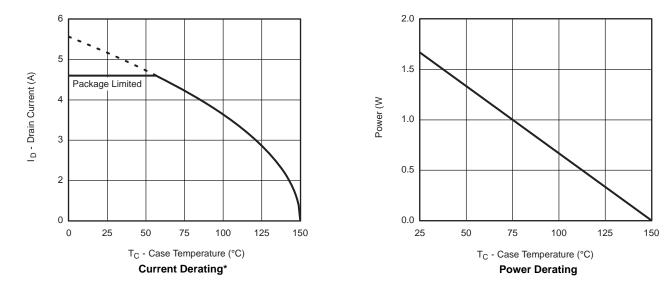
On-Resistance vs. Junction Temperature











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.







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 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	
C	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				



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)

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