

N-Channel 700V (D-S) Super Junction Power MOSFET

PRODUCT SUMMARY		
V _{DS} (V) at T _J max.	700	
R _{DS(on)} at 25 °C (Ω)	V _{GS} = 10 V	1.1

FEATURES

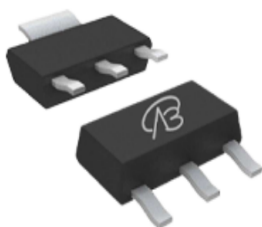
- Low figure-of-merit (FOM) R_{on} x Q_g
- Low input capacitance (C_{iss})
- Reduced switching and conduction losses
- Ultra low gate charge (Q_g)
- Avalanche energy rated (UIS)



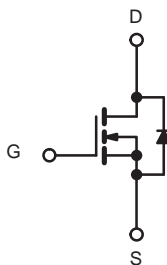
APPLICATIONS

- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- Lighting
 - High-intensity discharge (HID)
 - Fluorescent ballast lighting
- Industrial

SOT-223



Top View



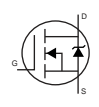
N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	700	V
Gate-Source Voltage	V _{GS}	± 30	
Continuous Drain Current (T _J = 150 °C)	V _{GS} at 10 V	T _C = 25 °C	A
		T _C = 100 °C	
Pulsed Drain Current ^a	I _{DM}	12	
Linear Derating Factor		1.67	W/°C
Single Pulse Avalanche Energy ^b	E _{AS}	400	mJ
Maximum Power Dissipation	P _D	80	W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C
Drain-Source Voltage Slope	dV/dt	T _J = 125 °C	V/ns
Reverse Diode dV/dt ^d		15	
Soldering Recommendations (Peak Temperature) ^c	for 10 s	260	°C

Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- V_{DD} = 100 V, starting T_J = 25 °C, L = 28.2 mH, R_G = 25 Ω, I_{AS} = 4A.
- 1.6 mm from case.
- I_{SD} ≤ I_D, dI/dt = 100 A/μs, starting T_J = 25 °C.

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.7	

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}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$		700	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}, I_D = 1\text{ mA}$		-	0.70	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		2.5	-	4.5	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20\text{ V}$		-	-	± 100	nA
		$V_{GS} = \pm 30\text{ V}$		-	-	± 1	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 700\text{ V}, V_{GS} = 0\text{ V}$		-	-	1	μA
		$V_{DS} = 560\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$		-	-	100	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 2.5\text{ A}$	-	1.1	-	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 30\text{ V}, I_D = 2.5\text{ A}$		-	5.6	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V},$ $V_{DS} = 100\text{ V},$ $f = 1\text{ MHz}$		-	1600	-	pF
Output Capacitance	C_{oss}			-	80	-	
Reverse Transfer Capacitance	C_{rss}			-	4	-	
Effective Output Capacitance, Energy Related ^a	$C_{o(er)}$	$V_{DS} = 0\text{ V to } 520\text{ V}, V_{GS} = 0\text{ V}$		-	62	-	
Effective Output Capacitance, Time Related ^b	$C_{o(tr)}$			-	213	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$I_D = 8\text{ A}, V_{DS} = 520\text{ V}$	-	8.2	-	nC
Gate-Source Charge	Q_{gs}			-	15	-	
Gate-Drain Charge	Q_{gd}			-	1.9	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 520\text{ V}, I_D = 8\text{ A},$ $V_{GS} = 10\text{ V}, R_g = 9.1\text{ }\Omega$		-	18	25	ns
Rise Time	t_r			-	24	55	
Turn-Off Delay Time	$t_{d(off)}$			-	8.0	-	
Fall Time	t_f			-	1.2	-	
Gate Input Resistance	R_g			$f = 1\text{ MHz}, \text{ open drain}$		-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	4	A
Pulsed Diode Forward Current	I_{SM}			-	-	12	
Diode Forward Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 8\text{ A}, V_{GS} = 0\text{ V}$		-	-	1.5	V
Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 8\text{ A},$ $di/dt = 100\text{ A}/\mu\text{s}, V_R = 400\text{ V}$		-	475	-	ns
Reverse Recovery Charge	Q_{rr}			-	5.8	-	μC
Reverse Recovery Current	I_{RRM}			-	35	-	A

Notes

- a. $C_{oss(er)}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .
- b. $C_{oss(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Fig. 1 - Typical Output Characteristics



Fig. 4 - Normalized On-Resistance vs. Temperature



Fig. 2 - Typical Output Characteristics

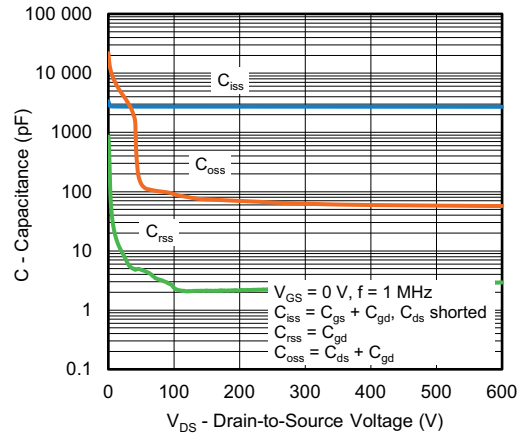


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

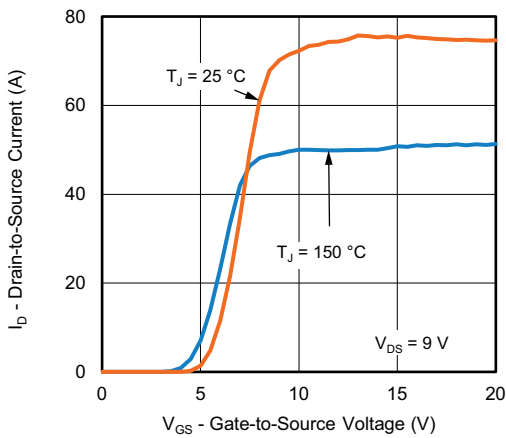


Fig. 3 - Typical Transfer Characteristics

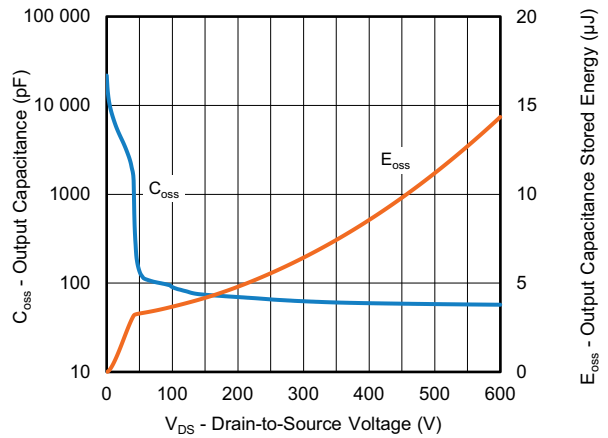


Fig. 6 - C_{oss} and E_{oss} vs. V_{DS}

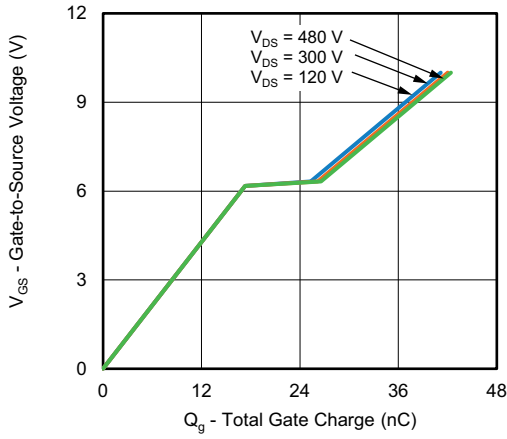


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage



Fig. 10 - Maximum Drain Current vs. Case Temperature

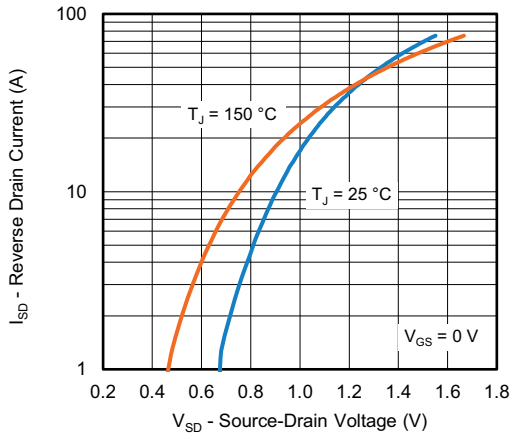


Fig. 8 - Typical Source-Drain Diode Forward Voltage

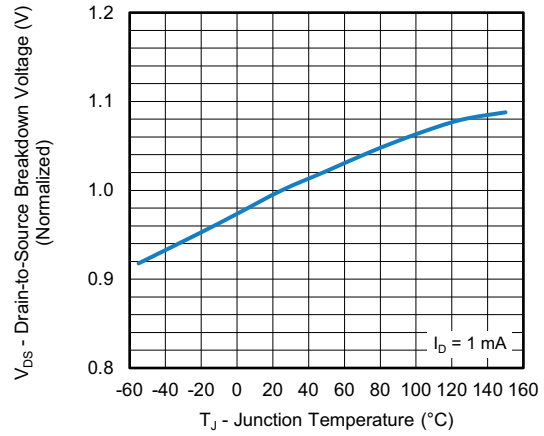


Fig. 11 - Temperature vs. Drain-to-Source Voltage



Fig. 9 - Maximum Safe Operating Area

Note

a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

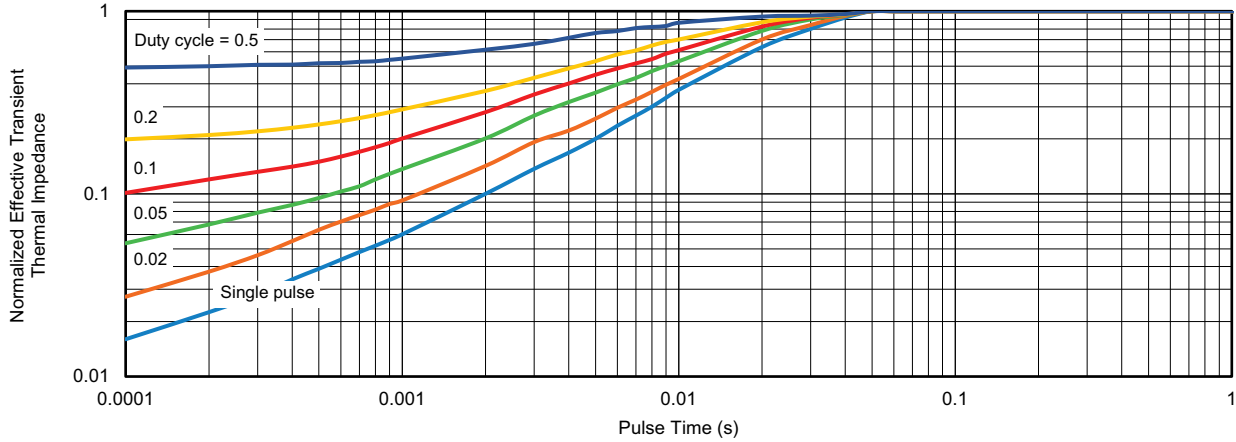


Fig. 12 - Normalized Transient Thermal Impedance, Junction-to-Case

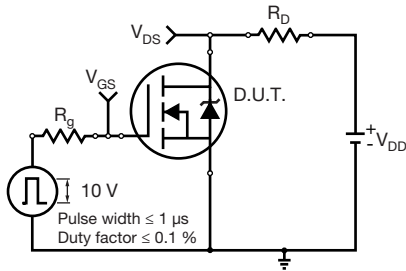


Fig. 13 - Switching Time Test Circuit

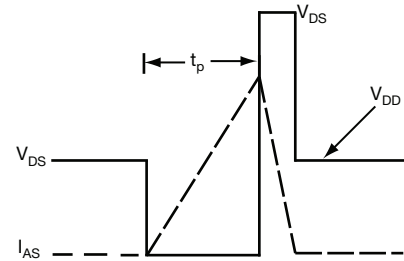


Fig. 16 - Unclamped Inductive Waveforms



Fig. 14 - Switching Time Waveforms

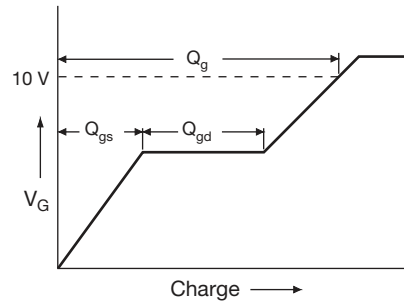


Fig. 17 - Basic Gate Charge Waveform

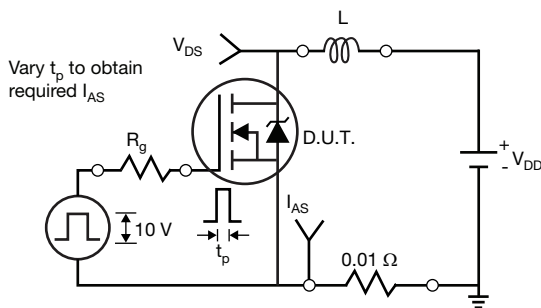


Fig. 15 - Unclamped Inductive Test Circuit

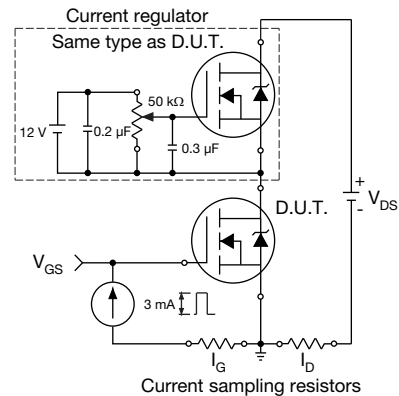
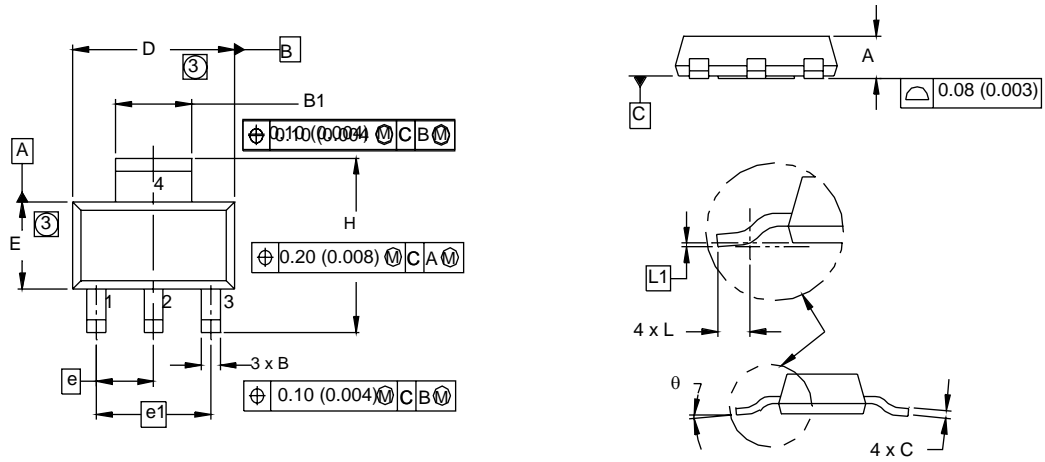


Fig. 18 - Gate Charge Test Circuit

SOT-223 (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.55	1.80	0.061	0.071
B	0.65	0.85	0.026	0.033
B1	2.95	3.15	0.116	0.124
C	0.25	0.35	0.010	0.014
D	6.30	6.70	0.248	0.264
E	3.30	3.70	0.130	0.146
e	2.30 BSC		0.0905 BSC	
e1	4.60 BSC		0.181 BSC	
H	6.71	7.29	0.264	0.287
L	0.91	-	0.036	-
L1	0.061 BSC		0.0024 BSC	
θ	-	10°	-	10°
ECN: S-82109-Rev. A, 15-Sep-08				
DWG: 5969				

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.2
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

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