MS23N22

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

Description

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low rDS(on) and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

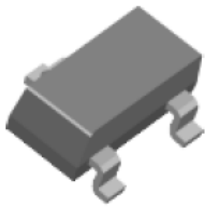
Features

- Low rDS(on) provides higher efficiency and extends battery life
- Low thermal impedance copper lead frame SOT-23 saves board space
- Fast switching speed
- High performance trench technology
- RoHS compliant package

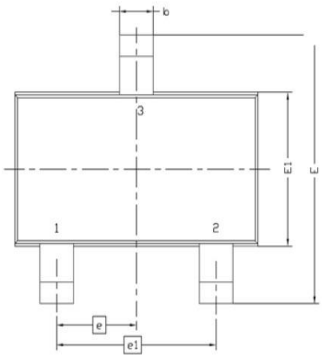
Package type：SOT-23

Packing & Order Information

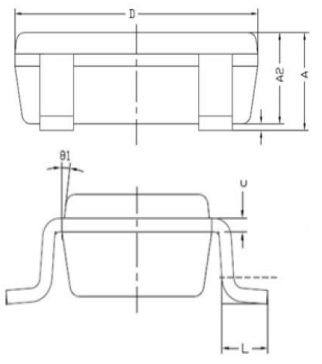
3,000/Reel



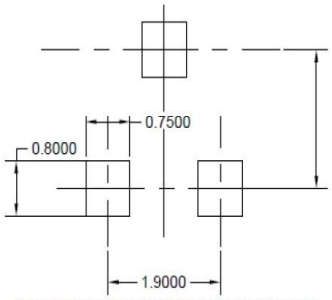
RoHS COMPLIANT



Symbol	MILLIMETERS	
	MIN	MAX
A	0.8	1.2
A1	0	0.1
A2	0.7	1.1
b	0.3	0.5
c	0.1	0.2
D	2.7	3.1
E	2.6	3
E1	1.4	1.8
e	0.95 BSC	
e1	1.9 BSC	
L	0.3	0.6
θ1	7° NOM	

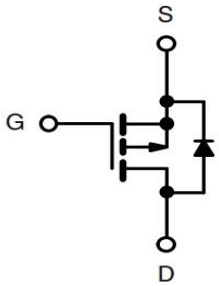


Recommended Pad Layout



Note: Drain opening is recommended to be solder mask defined in a copper fill for improved thermal performance

Graphic symbol



Absolute Maximum Ratings (Tc=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current[a] (T_A=25°C)	2.5	A
	Continuous Drain Current[a] (T_A=70°C)	2	A
I_{DM}	Pulsed Drain Current[b]	10	A
I_S	Continuous Source Current (Diode Conduction)[a]	0.46	A
P_D	Power Dissipation[a] (T_A=25°C)	1.25	W
	Power Dissipation[a] (T_A=70°C)	0.8	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	°C

- Drain current limited by maximum junction temperature

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Thermal Resistance Ratings			
Symbol	Parameter	Maximum	Units
R_{THJA}	Maximum Junction-to-Ambient C/W[a] (t <= 5 sec)	150	°C/W
	Maximum Junction-to-Ambient C/W[a] (Steady-State)	200	

Notes:

a. Surface Mounted on 1" x 1" FR4 Board.

b. Pulse width limited by maximum junction temperature

Static						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$V_{GS(th)}$	Gate-Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	1.0	1.5	3	V
I_{GSS}	Gate-Body Leakage	V_{DS} =0 V , V_{GS} = 8 V		4	100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 16 V , V_{GS} = 0 V V_{DS} = 20 V , V_{GS} = 0 V , T_J= 55°C		7	1 10	uA
$I_{D(on)}$	On-State Drain Current[A]	V_{DS} = 5 V, V_{GS} = 4.5 V	6			A
$R_{DS(on)}$	Drain-Source On-Resistance[A]	V_{GS} = 10 V, I_D = 2.5 A V_{GS} = 4.5 V, I_D = 1.7 A		62 102	85 125	mΩ
g_{fs}	Forward Tranconductance[A]	V_{DS} = 5 V, I_D = 3.0 A		3.5		S
V_{SD}	Diode Forward Voltage	I_S = 0.46 V, V_{GS} = 0 V		0.65		V

Dynamic[b]						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q_g	Total Gate Charge	V_{DS} = 10 V , I_D = 2.5 A, V_{GS} = 4.5 V	--	3.5	7	nC
Q_{gs}	Gate-Source Charge		--	0.8	2	nC
Q_{gd}	Gate-Drain Charge		--	1.0	2	nC
C_{ISS}	Input Capacitance	V_{DS} = 15 V , V_{GS} = 0 V f = 1MHz	--	720	1500	nC
C_{OSS}	Output Capacitance		--	165	400	nC
C_{RSS}	Reverse Transfer Capacitance		--	60	200	nC
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 10 V , I_L = 1 A, V_{GEN} = 4.5 V , R_G =6 Ω	--	10	20	ns
t_r	Rise Time		--	13	30	ns
$t_{d(off)}$	Turn-Off Delay Time		--	14	30	ns
tf	Fall Time		--	4	20	ns

Notes:

a. Pulse test: PW <= 300us duty cycle <= 2%.

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

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■Typical Electrical Characteristics

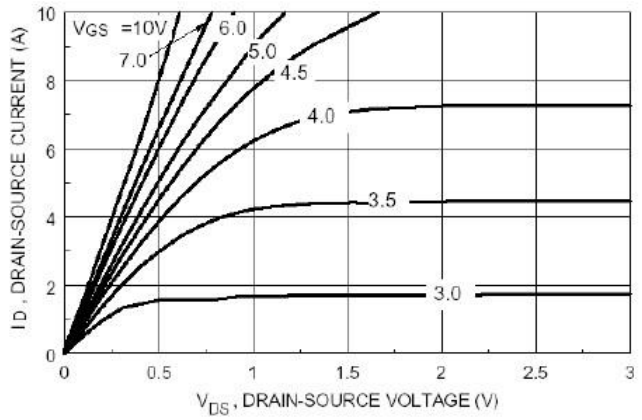

FIG.1-ON REGION CHARACTERISTICS

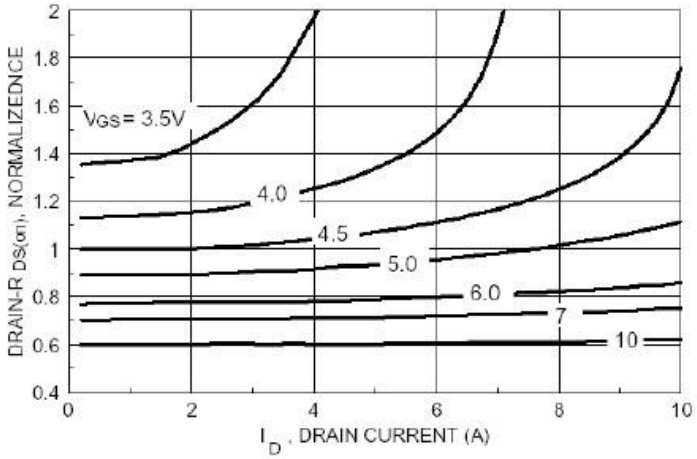

FIG.2-ON-RESISTANCE VARIATION WITH DARIN CURRENT AND GATE VOLTAGE

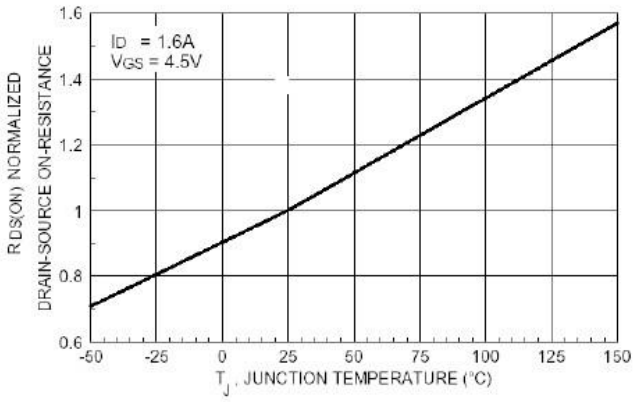

FIG.3-ON-RESISTANCE VARIATION WITH TEMPERATURE

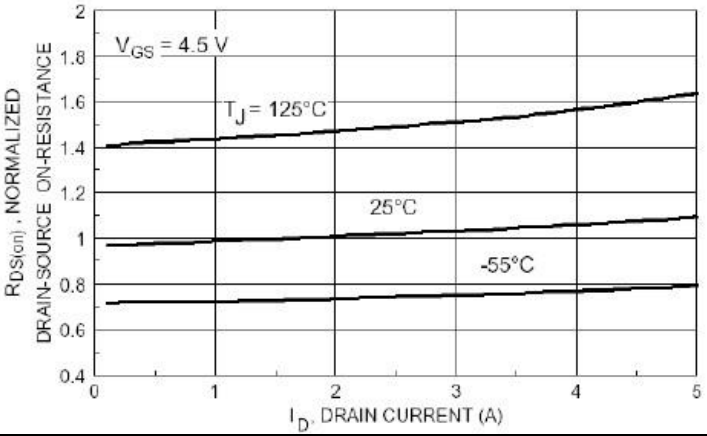

FIG.4-ON-RESISTANCE VARIATION WITH DRAIN CURRENT AND TEMPERATURE

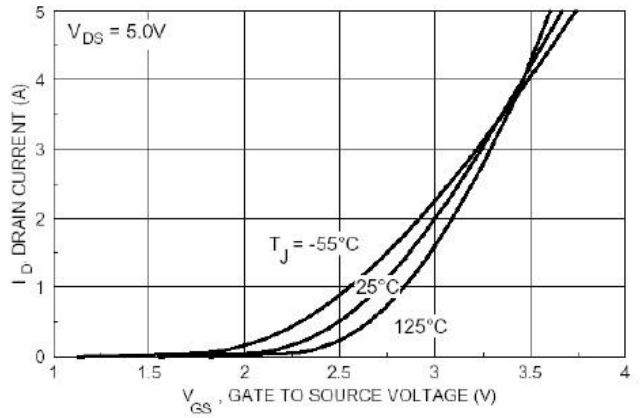

FIG.5-TRANSFERCHARACTERISTICS

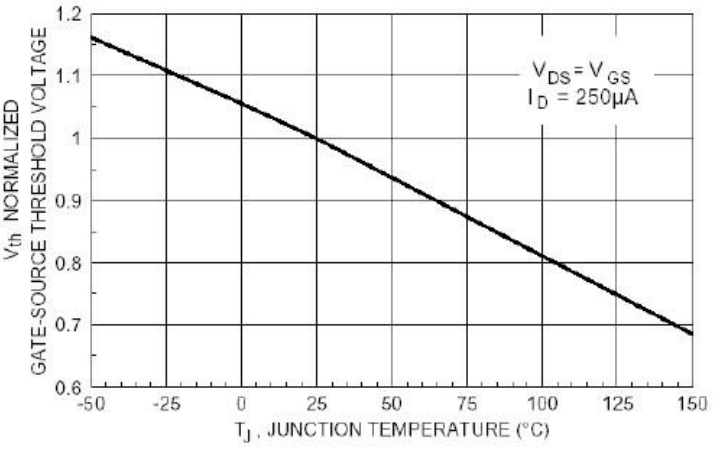

FIG.6-GATE THRESHOLD VARIATION WITH TEMPERATURE

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■Typical Electrical Characteristics

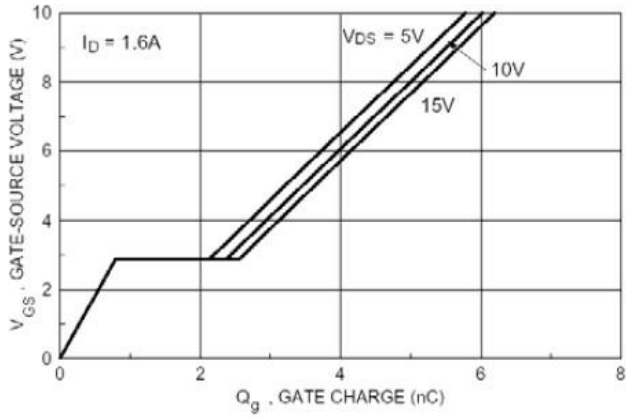

FIG.7-GATE CHARGE CHARACTERISTIC

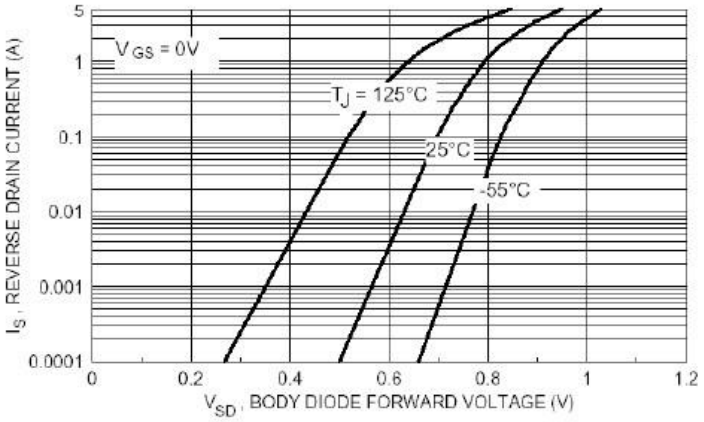

FIG.8-CAPACITANCE CHARACTERISTIC

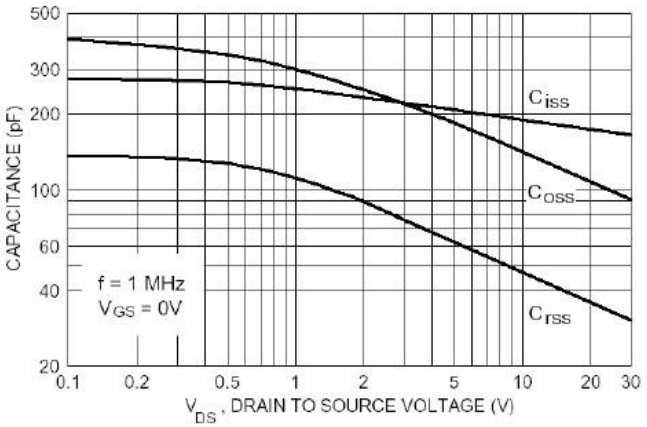

FIG.9-MAXIMUM SAFE OPERATING AREA

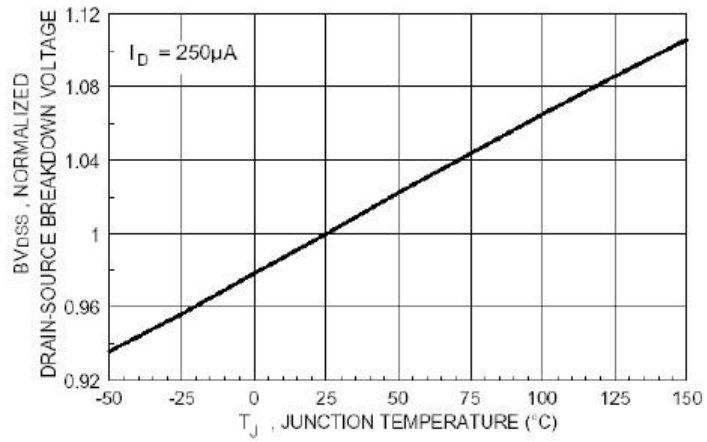

FIG.10-BREAKDOWN VOLTAGE VARIATION WITH TEMPERATURE

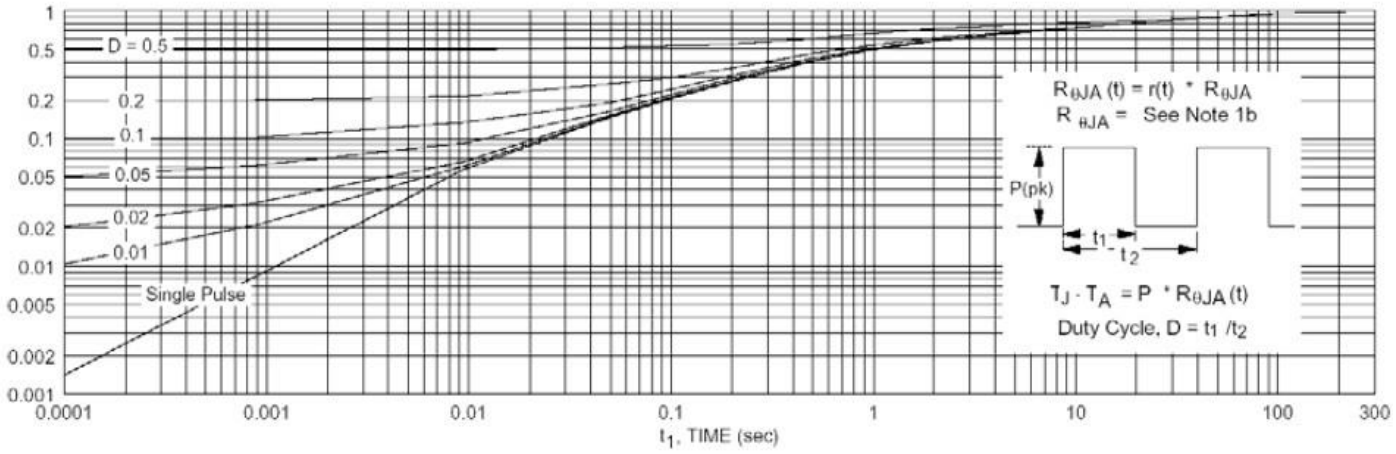

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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