MS23P59

P-Channel -60-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

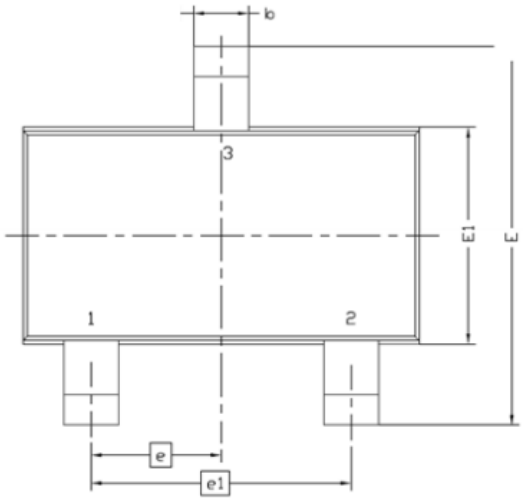
- Low rDS(on) trench technology
- Low thermal impedance
- Fast switching speed
- RoHS compliant package

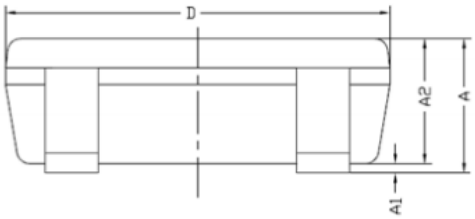
Typical Applications:

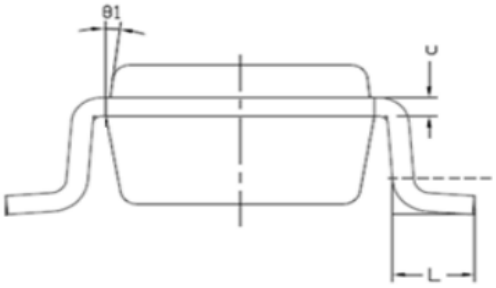
- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

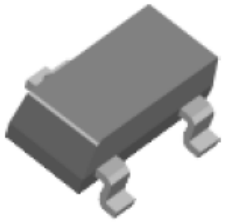
Packing & Order Information

3,000/Reel



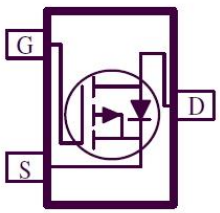






RoHS
COMPLIANT

Graphic symbol



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	

MS23P59

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current[a] (T_A =25°C)	-1.6	A
	Continuous Drain Current[a] (T_A =70°C)	-1.2	A
I_{DM}	Pulsed Drain Current[b]	-10	A
I_S	Continuous Source Current (Diode Conduction)[a]	-1.6	A
P_D	Power Dissipation[a] (T_A =25°C)	1.3	W
	Power Dissipation[a] (T_A =70°C)	0.8	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	°C

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient[a] (t <= 10 sec)	100	°C/W
	Maximum Junction-to-Ambient[a] (Steady-State)	166	

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	-1.8	-3.5	V
I_{GSS}	Gate-Body Leakage	V_{DS} = 0 V , V_{GS} = ±20 V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -48 V , V_{GS} = 0 V V_{DS} = -48 V , V_{GS} = 0 V , T_J= 55°C			-1 -10	uA
$I_{D(on)}$	On-State Drain Current	V_{DS} = 5 V , V_{GS} = 10 V	-5			A
$r_{DS(on)}$	Drain-Source On-Resistance	V_{GS} = -10 V , I_D = -1.3 A V_{GS} = -4.5 V , I_D = -1.1 A			381 561	Ω
g_{fs}	Forward Tranconductance	V_{DS} = -15 V , I_D = -1.3 A		10		S
V_{SD}	Diode Forward Voltage	I_S = -0.8 A , V_{GS} = 0 V		-0.83		V

Dynamic[b]

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q_g	Total Gate Charge	V_{DS} = -30 V , I_D = -1.3 A , V_{GS} = -4.5 V	--	5	--	nC
Q_{gs}	Gate-Source Charge		--	1.5	--	nC
Q_{gd}	Gate-Drain Charge		--	2.5	--	nC

MS23P59

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Dynamic[b]						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ.**	**Max.**	**Units**
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = -30 V , R_L = 23.1 Ω , V_{GEN} = -10 V , R_{GEN} = 6 Ω , I_D = -1.3 A	--	7	--	ns
t_r	Rise Time		--	5	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	24	--	ns
tf	Fall Time		--	6	--	ns
C_{ISS}	Input Capacitance	V_{DS} = -15 V , V_{GS} = 0 V , f =1.0MHz	--	371	--	pF
C_{OSS}	Output Capacitance		--	31	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	26	--	pF

Notes:

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

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

MS23P59

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■Typical Electrical Characteristics

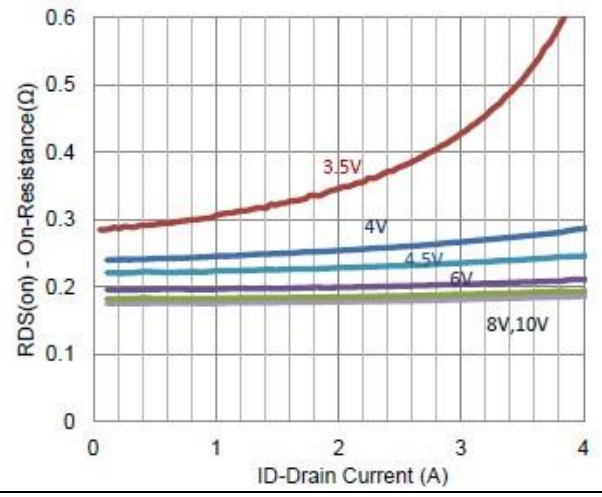

FIG.1-ON RESISTANCE VS. DRAIN CURRENT

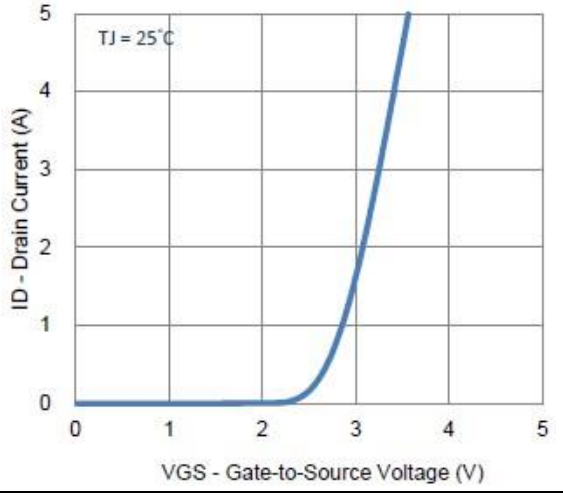

FIG.2-TRANSFER CHARACTERISTICS

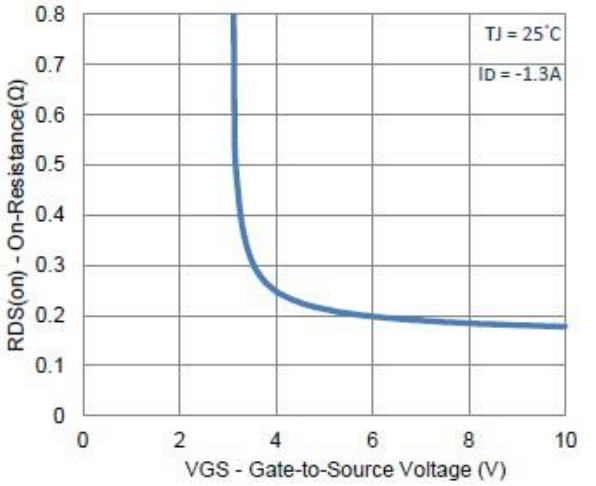

FIG.3-ON RESISTANCE VS GATE-TO-SOURCE VOLTAGE

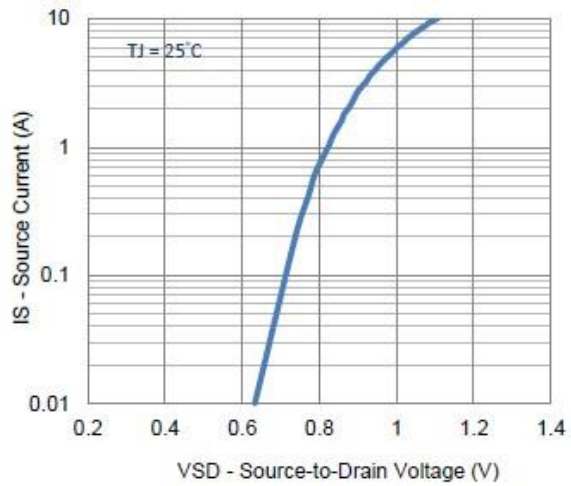

FIG.4-DRAIN-TO-SOURCE FORWARD VOLTAGE

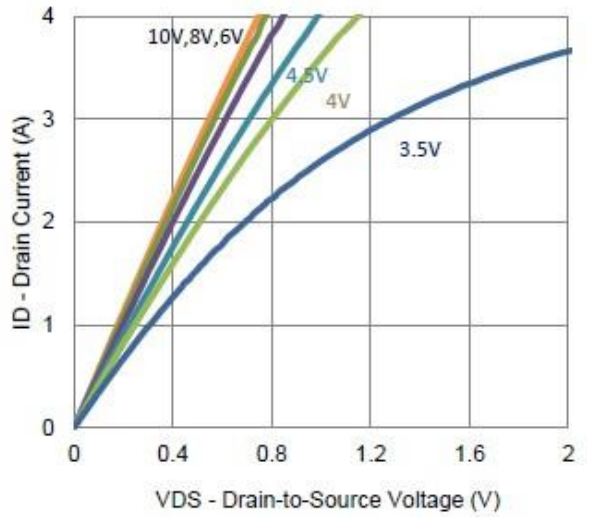

FIG.5-OUTPUT CHARACTERISTICS

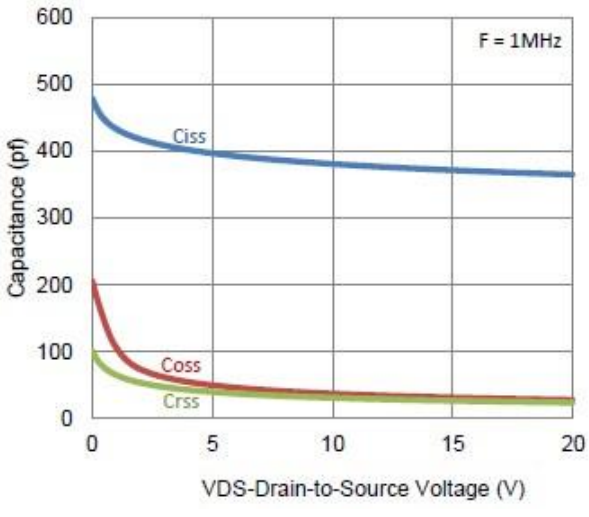

FIG.6-CAPACITANCE

■Typical Electrical Characteristics

MS23P59

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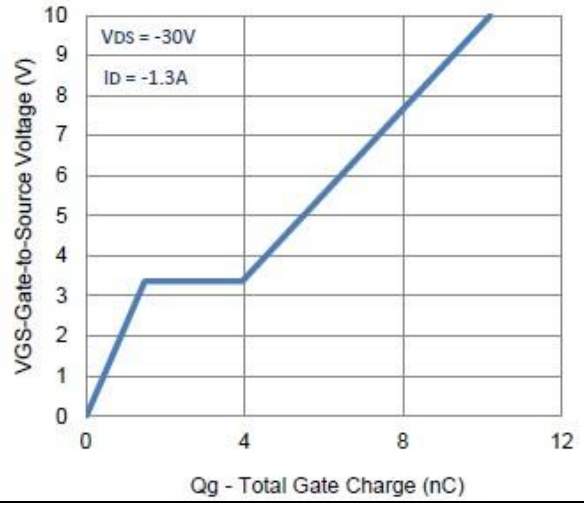

FIG.7-GAGE CHARGE

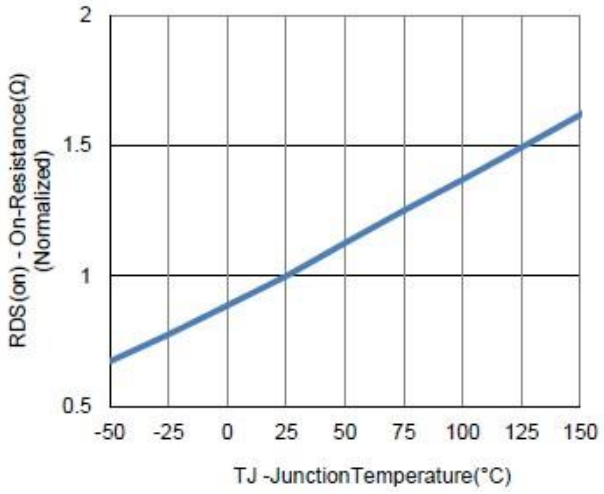

FIG.8-NORMALIZED ON-RESISTANCE VS JUNCTION TMPERATURE

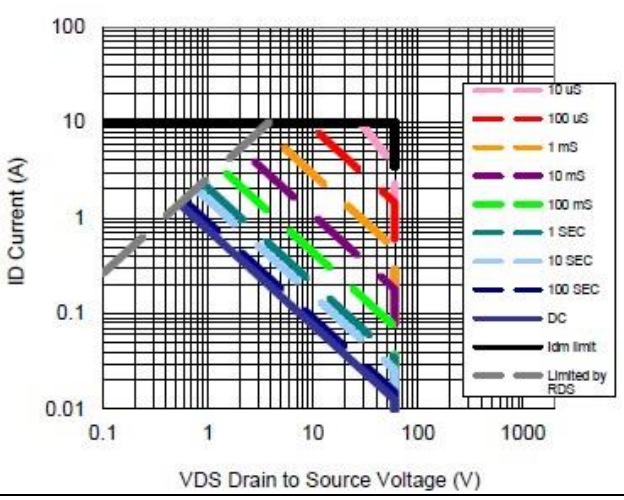

FIG.9-SAFE OPERATING AREA

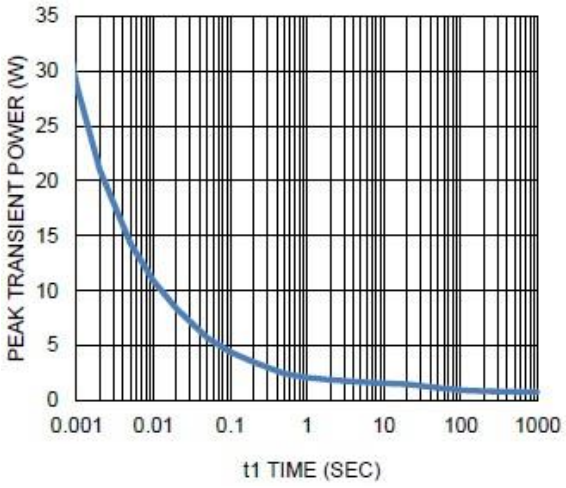

FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

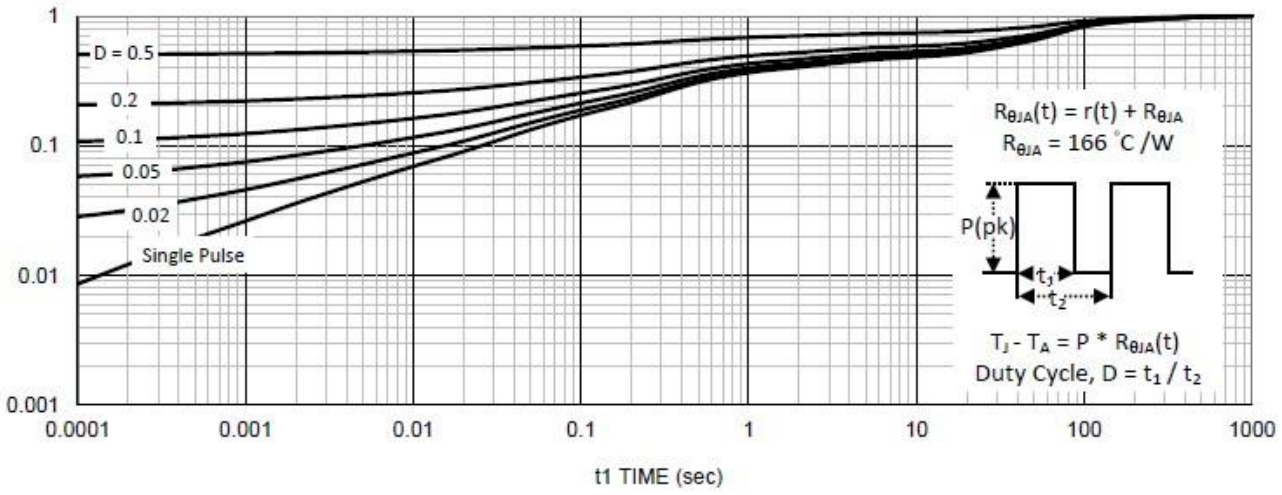

FIG.11-NORMALIZED THERMAL TRANSIENT JUNCTION TO AMBIENT

MS23P59

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