MSH60N23D

N -Channel 60-V (D-S) MOSFET

Description

The device is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The device meets the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Features

- Suit for 4.5V Gate Drive Applications
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

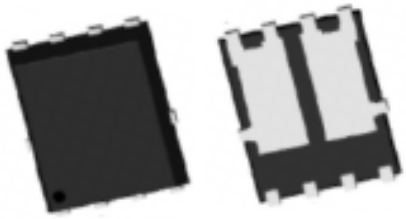
Typical Applications

- DC Fan
- Motor Drive Applications
- Networking
- Half / Full Bridge Topology

Package type：PDFN 5X6

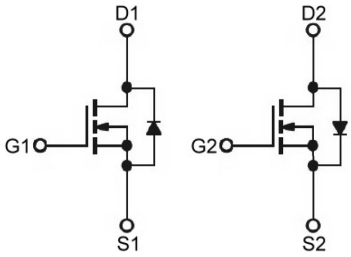
Packing & Order Information

3,000/Reel

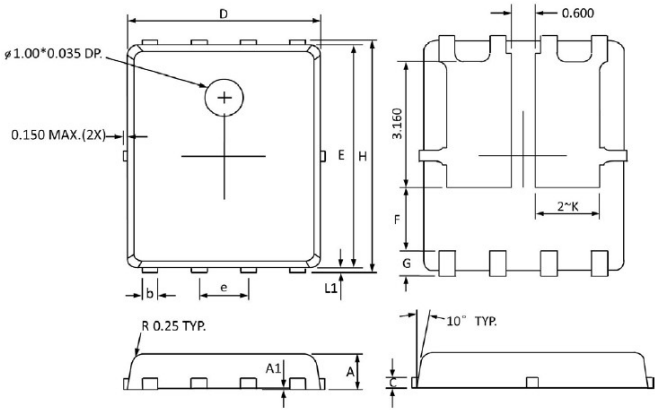


RoHS Compliant

Graphic Symbol

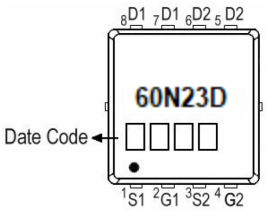


Package Dimension



REF.	Millimeter			REF.	Millimeter		
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	0.90	1.00	1.10	E	5.70	-	5.90
A1	0.00	-	0.05	e	-	1.27	-
b	0.33	-	0.51	H	5.90	-	6.20
c	0.20	-	0.30	G	0.50	-	0.70
D	4.80	-	5.00	L1	0.06	-	0.20
F	1.6 Ref.			K	-	1.60	-

Marking



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N -Channel 60-V (D-S) MOSFET **MAXIMUM**

RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings			
Symbol	**Parameter**	**Value**	**Units**
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current[1] (T_C =25°C)	23	A
	Continuous Drain Current[1] (T_C =100°C)	15	A
I_{DM}	Pulsed Drain Current[1,2]	46	A
I_{AS}	Single Pulse Avalanche Current, L =0.1mH[3]	23	A
E_{AS}	Single Pulse Avalanche Energy, L =0.1mH[3]	26.5	mJ
P_D	Power Dissipation[4] (T_C =25°C)	41.6	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[1]	62	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case[1]	3	°C/W

Electrical Characteristics (T_J=25°C unless otherwise specified)						
Symbol	**Parameter**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
$V_{GS\ (th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =250μA	1.2	-	2.5	V
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} =0V, I_D =250μA	60	-	-	V
g_{fs}	Forward Transconductance	V_{DS} =5V, I_D =15A	-	17	-	S
I_{GSS}	Gate-Source Leakage Current	V_{DS} =0V, V_{GS} =±20V	-	-	±100	nA
I_{DSS}	Drain-Source Leakage Current	V_{DS} =48V, V_{GS} =0V, T_J =25°C V_{DS} =48V, V_{GS} =0V, T_J =55°C	-	-	1 10	μA
$R_{DS\ (on)}$	Static Drain-Source On-Resistance[2]	V_{GS} =10V, I_D =15A V_{GS} =4.5V, I_D =10A	- -	- -	32 38	mΩ
EAS	Single Pulse Avalanche Energy[5]	V_{DD} =25V, L =0.1mH, I_{AS} =15A	11.2	-	-	mJ
V_{SD}	Diode Forward Voltage[2]	I_S =1A, V_{GS} =0V, T_J =25°C	-	-	1.2	V
I_S	Continuous Source Current[1,6]	V_G =V_D =0V, Force Current	-	-	23	A
I_{SM}	Pulsed Source Current[2,6]		-	-	46	

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Dynamic						
Symbol	**Parameter**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Q_g	Total Gate Charge[2]	V_{DS} =48V	--	12.6	--	nC
Q_{gs}	Gate-Source Charge	I_D =12A	--	3.2	--	
Q_{gd}	Gate-Drain Charge	V_{GS} =4.5V	--	6.3	--	
$t_{d(on)}$	Turn-On Delay Time[2]	V_{DS} =30V	--	8	--	ns
t_r	Rise Time	I_D =10A	--	14.2	--	
$t_{d(off)}$	Turn-Off Delay Time	V_{GS} =10V	--	24.4	--	
t_f	Fall Time	R_G =3.3Ω	--	4.6	--	
C_{ISS}	Input Capacitance	V_{DS} =15V	--	1378	--	pF
C_{OSS}	Output Capacitance	V_{GS} =0V	--	86	--	
C_{RSS}	Reverse Transfer Capacitance	f =1.0MHz	--	64	--	
Rg	Gate Resistance	V_{GS} =V_{DS} =0V, f =1.0MHz	--	3.2	--	Ω

Notes

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. The EAS data shows maximum rating. The test condition is N-ch V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=23A
4. The power dissipation is limited by 150℃ junction temperature.
5. The Min. value is 100% EAS tested guarantee.
6. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

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- **Typical Electrical Characteristics N-Channel**

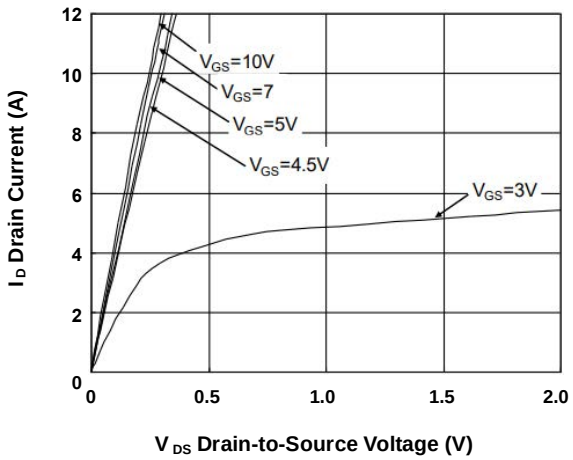

FIG.1-Typical Output Characteristics

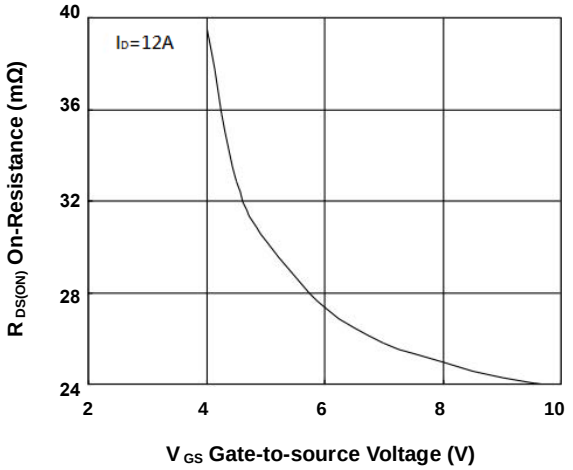

FIG.2-On-Resistance vs. G-S Voltage

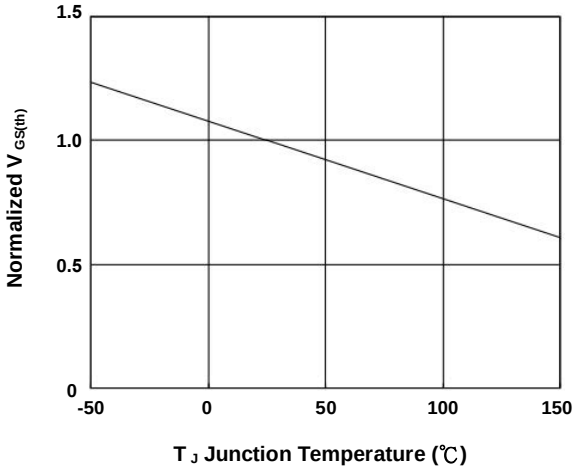

FIG.3-Normalized $V_{GS(th)}$ vs. T_J

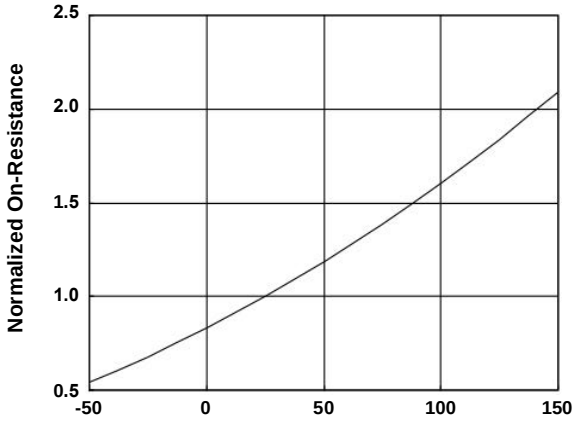

FIG.4-Normalized R_{DSON} vs. T_J

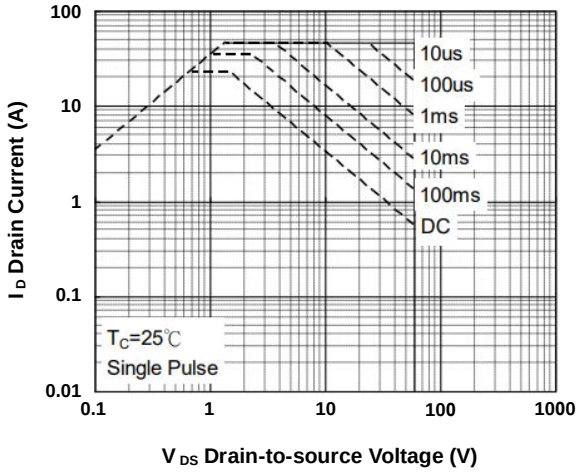

FIG.5-Safe Operating Area

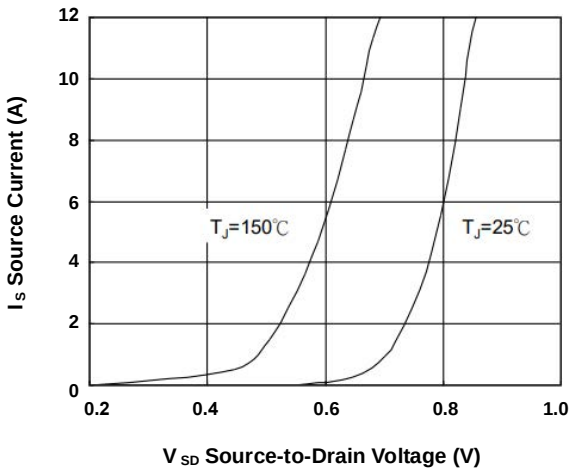

FIG.6-Forward Characteristics of Reverse

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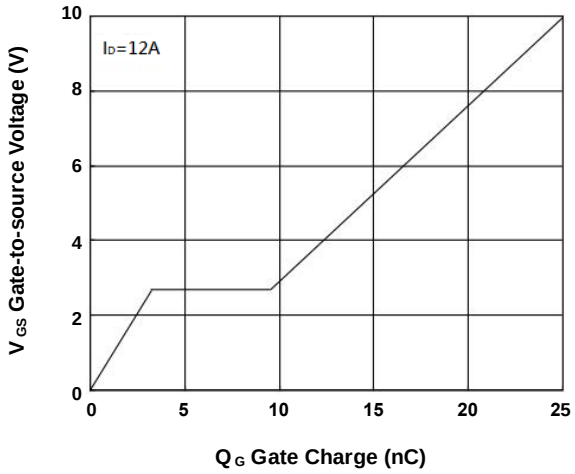

FIG.7-Gate Charge Characteristics

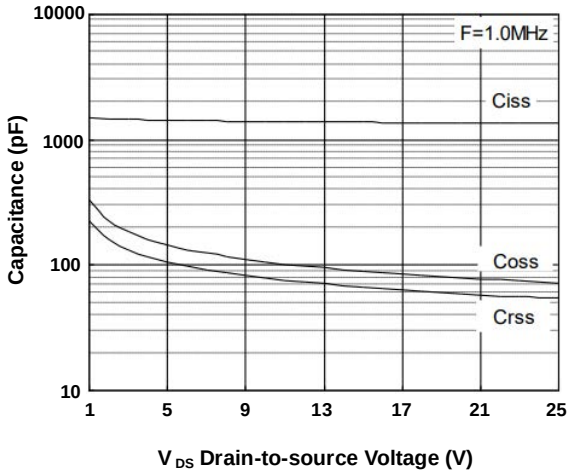

FIG.8-Capacitance Characteristics

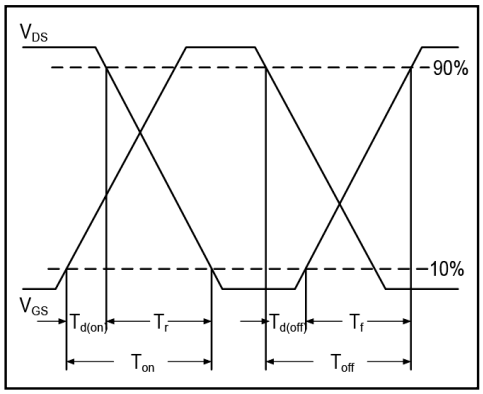

FIG.9-Switching Time Waveform

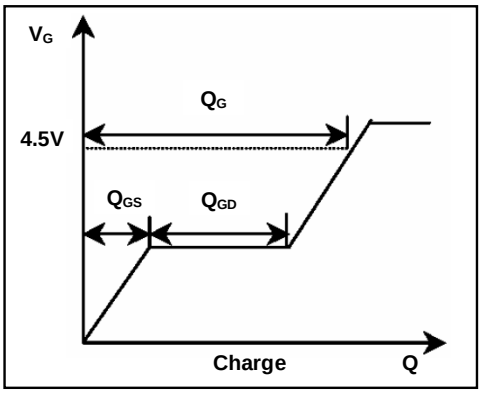

FIG.10-Gate Charge Waveform

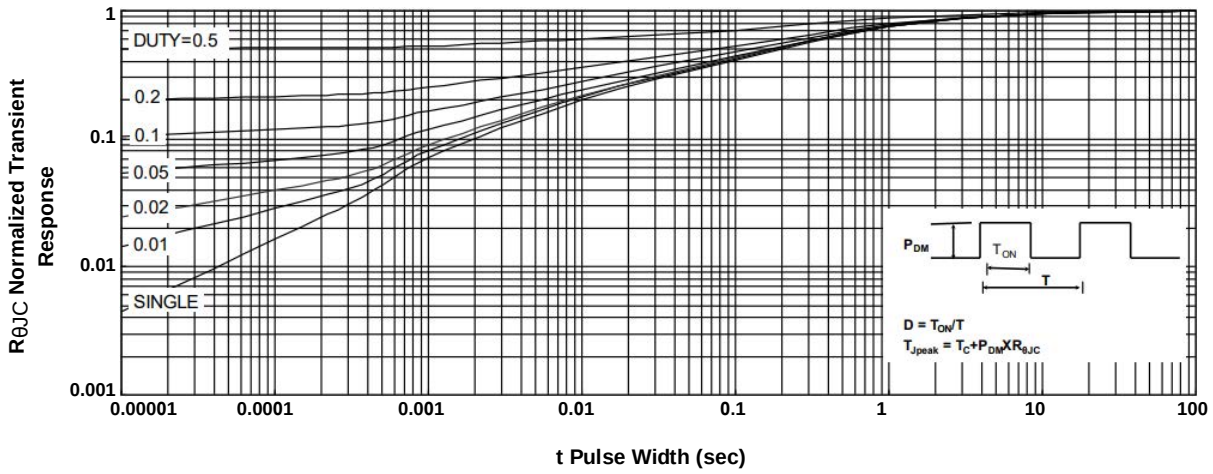

FIG.11-Normalized Maximum Transient Thermal Impedance

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