

MSH60N063

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

- $R_{DS(ON)} = 6.3m\Omega @ V_{GS} = 10V$
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

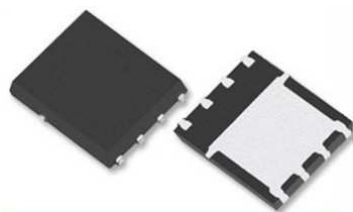
Typical Applications

- Motor Drive
- Power Tools
- LED Lighting

Package type : PDFN 5X6

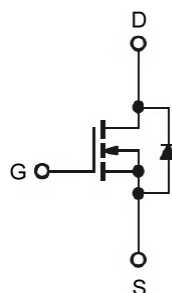
Packing & Order Information

3,000/Reel

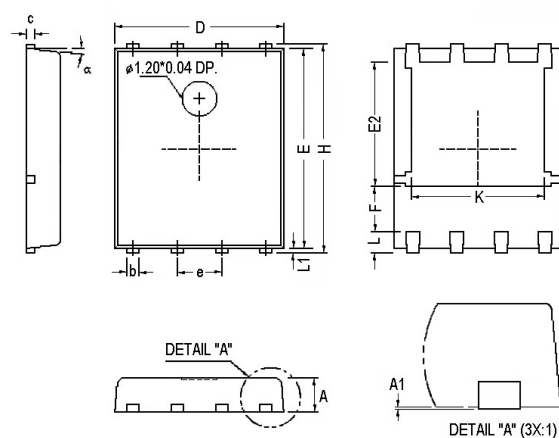


RoHS Compliant

Graphic Symbol

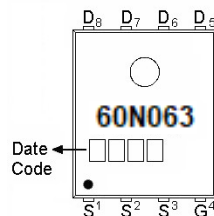


Package Dimension



REF.	Millimeter			REF.	Millimeter		
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	0.85	1.00	1.15	E	5.70	-	5.90
A1	0.00	-	0.10	e	-	1.27	-
b	0.30	-	0.51	H	5.90	-	6.20
c	0.20	-	0.30	L	-	0.60	-
D	4.80	-	5.00	L1	0.06	-	0.20
F	1.10 Ref.			α	0°	-	12°
E2	3.50 Ref.			K	3.70	3.90	4.10

Marking



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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 ($T_C=25^\circ\text{C}$)	90	A
	Continuous Drain Current ¹ ($T_C=100^\circ\text{C}$)	55	A
I_{DM}	Pulsed Drain Current ^{1,2}	360	A
I_{AS}	Single Pulse Avalanche Current, $L=0.1\text{mH}^3$	50	A
E_{AS}	Single Pulse Avalanche Energy, $L=0.1\text{mH}^3$	320	mJ
P_D	Power Dissipation ⁴ ($T_C=25^\circ\text{C}$)	78	W
	Power Dissipation ⁴ ($T_C=100^\circ\text{C}$)	31	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ¹	62.5	$^\circ\text{C/W}$
$R_{\theta JC}$	Maximum Junction-to-Case ¹	1.6	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.0	-	2.5	V
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	60	-	-	V
g_{fs}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=20\text{A}$	-	39	-	S
I_{GSS}	Gate-Source Leakage Current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$	-	-	± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^\circ\text{C}$	-	-	20	
$R_{DS(on)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10\text{V}$, $I_D=20\text{A}$	-	4.7	6.3	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=15\text{A}$	-	6.8	9.0	
E_{AS}	Single Pulse Avalanche Energy ⁵	$V_{DD}=40\text{V}$, $L=0.1\text{mH}$, $I_{AS}=55\text{A}$	151	-	-	mJ
V_{SD}	Diode Forward Voltage ²	$I_S=20\text{A}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	-	-	1.2	V
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0\text{V}$, Force Current	-	-	90	A
I_{SM}	Pulsed Source Current ^{2,6}		-	-	250	

Notes

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
3. The EAS data shows maximum rating. The test condition is $V_{DD}=40\text{V}$, $V_{GS}=10\text{V}$, $L=0.1\text{mH}$, $I_{AS}=80\text{A}$.
4. The power dissipation is limited by 150 $^\circ\text{C}$ 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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Dynamic						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS}=30V$	--	40.3	--	nC
Q_{gs}	Gate-Source Charge	$I_D=20A$	--	8	--	
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=10V$	--	7.3	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DS}=30V$	--	15.5	--	ns
t_r	Rise Time	$R_L=1.5\Omega$	--	3.1	--	
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS}=10V$	--	33.6	--	
t_f	Fall Time	$R_G=6\Omega$	--	5.6	--	
C_{ISS}	Input Capacitance	$V_{DS}=30V$	--	2133	--	pF
C_{OSS}	Output Capacitance	$V_{GS}=0V$	--	399	--	
C_{RSS}	Reverse Transfer Capacitance	$f=1.0MHz$	--	79	--	
R_g	Gate Resistance	$V_{GS}=V_{DS}=0V, f=1.0MHz$	--	1.3	--	Ω

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• Typical Electrical Characteristics

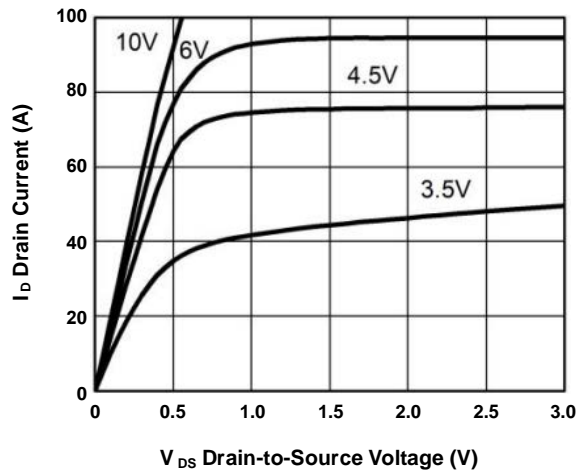


FIG.1-Typical Output Characteristics

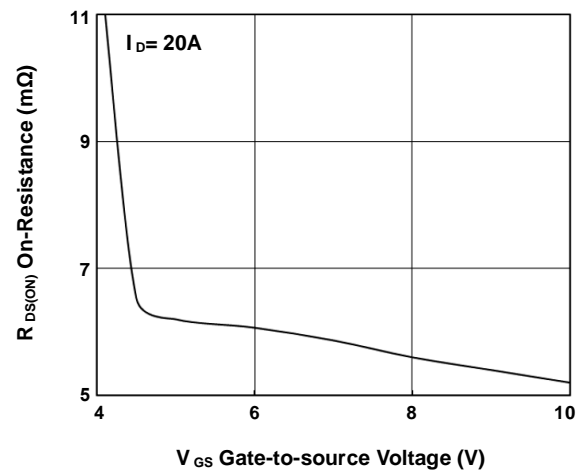


FIG.2-On-Resistance vs. G-S Voltage

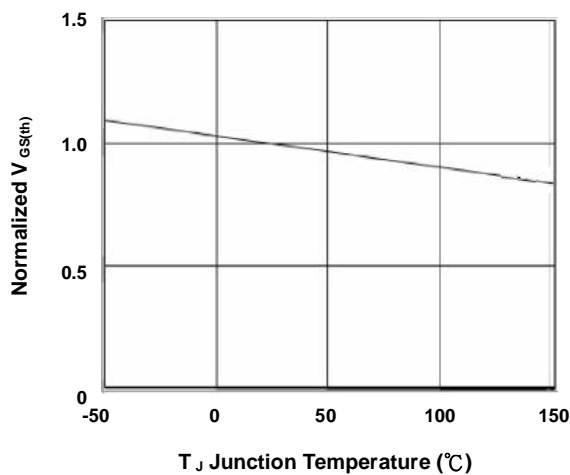


FIG.3-Normalized $V_{GS(th)}$ vs. T_J

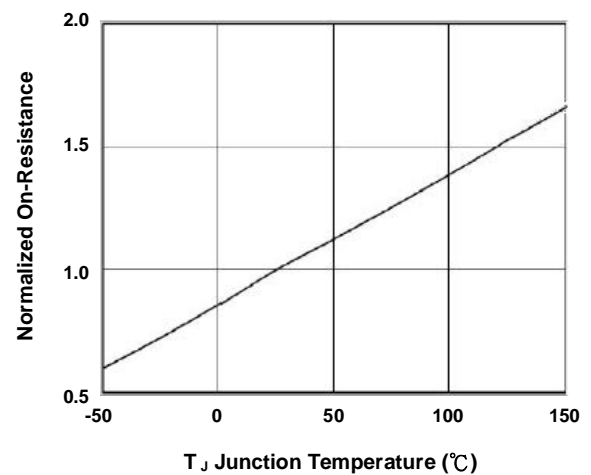


FIG.4-Normalized $R_{DS(on)}$ vs. T_J

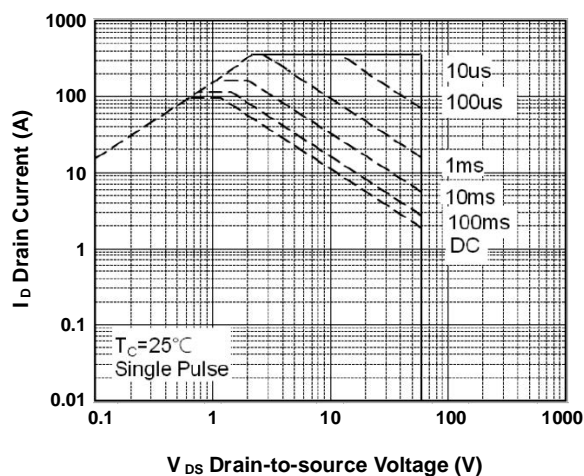


FIG.5-Safe Operating Area

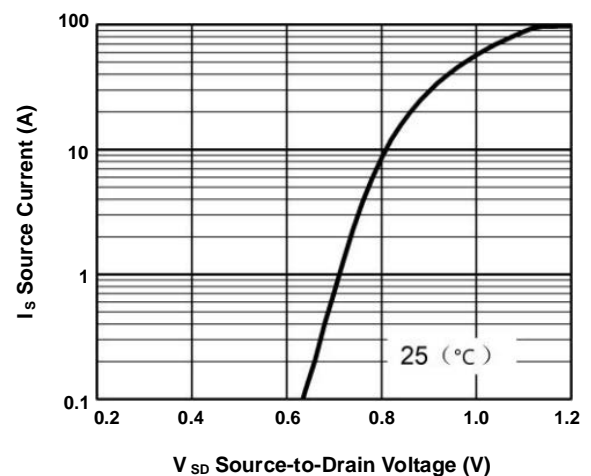


FIG.6-Forward Characteristics of Reverse

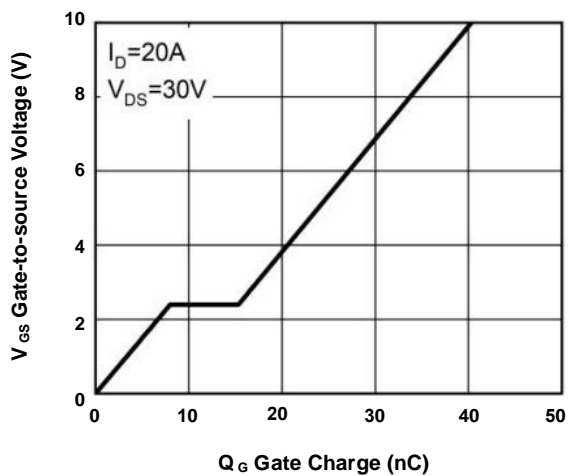


FIG.7-Gate Charge Characteristics

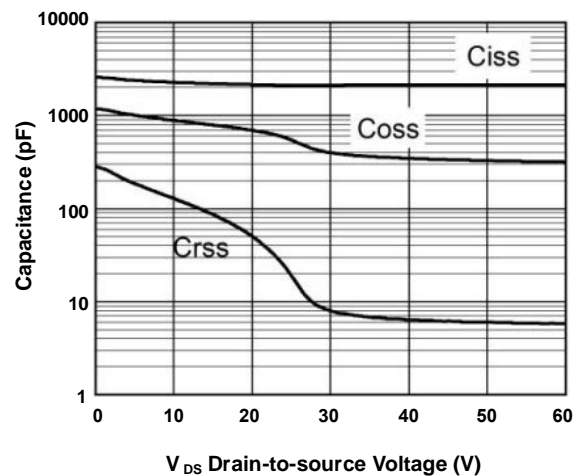


FIG.8-Capacitance Characteristics

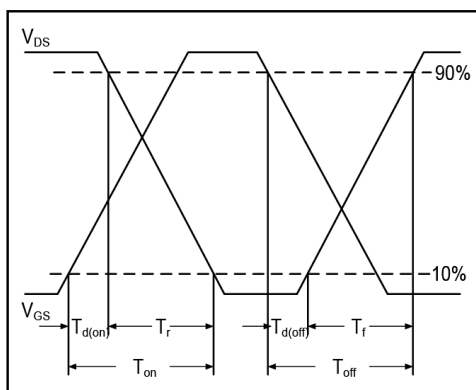


FIG.9-Switching Time Waveform

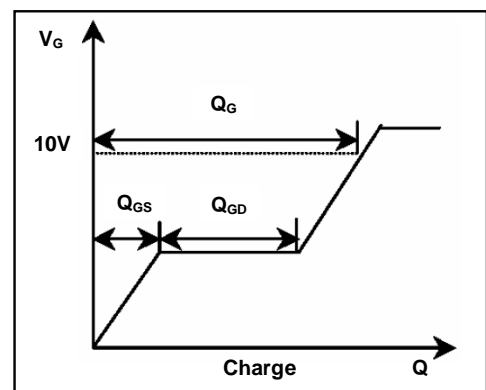


FIG.10-Gate Charge Waveform

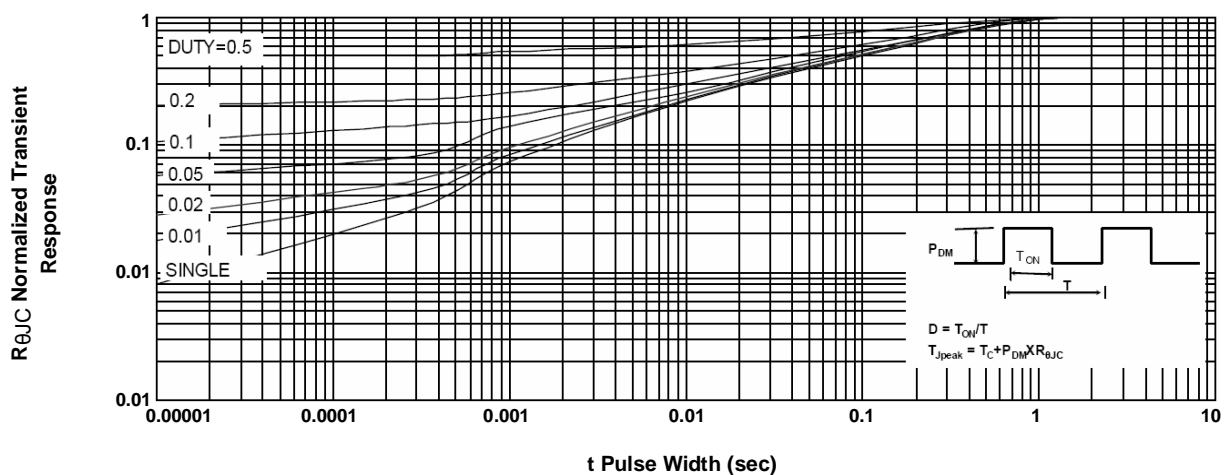


FIG.11-Normalized Maximum Transient Thermal Impedance

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