MS60N05

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

Description

The MS60N05 is a high performance trench N-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the small power switching and load switch applications.

The device meets the RoHS and Green Product requirement with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Low On-Resistance
- Low Gate Charge
- Low Input Capacitance
- Green Device Available

Typical Applications

- Motor Drive
- Power Tools
- LED Lighting

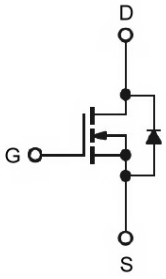
Package type：SOT-23

Packing & Order Information

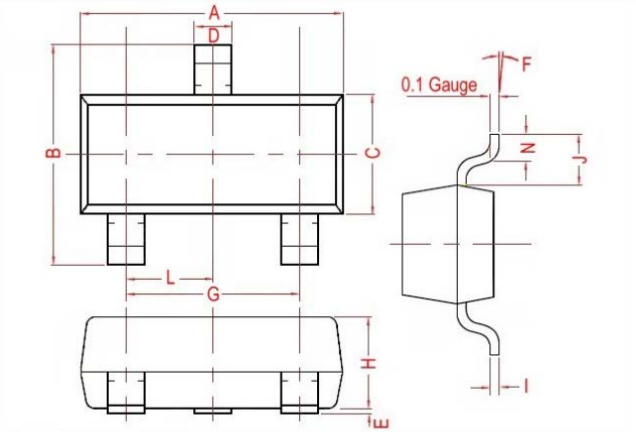
3,000/Reel

RoHS Compliant

Graphic Symbol

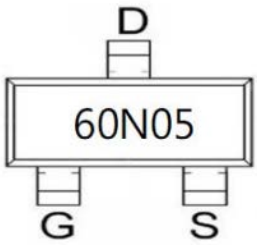


Package Dimension



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.10	G	1.90 Ref.	
B	2.30	3.00	H	0.90	1.30
C	1.20	1.75	I	0.05	0.21
D	0.30	0.50	J	0.58 Ref.	
E	0.01	0.15	L	0.95 Typ.	
F	0°	10°	N	0.20 Min.	

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (unless otherwise specified)

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_A=25°C)	5	A
	Continuous Drain Current[1] (T_A=70°C)	3.5	A
I_{DM}	Pulsed Drain Current[1,2] (T_A=25°C)	30	A
EAS	Single Pulse Avalanche Energy[3]	22	mj
IAS	Single Pulse Avalanche Current[3]	21	A
P_D	Power Dissipation[4] (T_A=25°C)	2.7	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]	125	°C/W
$R_{\theta JC}$	Maximum Junction-to-case[1]	80	°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	1.0	-	2.5	V
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	60	-	-	V
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 5	μA
$R_{DS\ (on)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=4A V_{GS}=4.5V, I_D=2A	- -	- -	60 70	mΩ
V_{SD}	Diode Forward Voltage[2]	I_S=1A, V_{GS}=0V, T_J=25°C	-	-	1.2	V
I_S	Continuous Source Current[1,5] **(Diode)**	V_G=V_D=0V, Force Current	-	-	5	A

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Dynamic and switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge[2]	V_{DS} =48V	--	19	--	nC
Q_{gs}	Gate-Source Charge	I_D =4A	--	2.6	--	
Q_{gd}	Gate-Drain (“Miller”) Charge	V_{GS} =10V	--	4.1	--	
$t_{d(on)}$	Turn-On Delay Time[2]	V_{DS} =30V	--	3	--	ns
t_r	Rise Time	I_D =4A	--	34	--	
$t_{d(off)}$	Turn-Off Delay Time	V_{GS} =10V	--	23	--	
t_f	Fall Time	R_G =3.3Ω	--	6	--	
C_{ISS}	Input Capacitance	V_{DS} =15V	--	1027	--	pF
C_{OSS}	Output Capacitance	V_{GS} =0V	--	65	--	
C_{RSS}	Reverse Transfer Capacitance	f =1.0MHz	--	46	--	

Notes

1. 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 Max. rating with test condition V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=21A
4. The power dissipation is limited by 150℃ junction temperature.
5. 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**

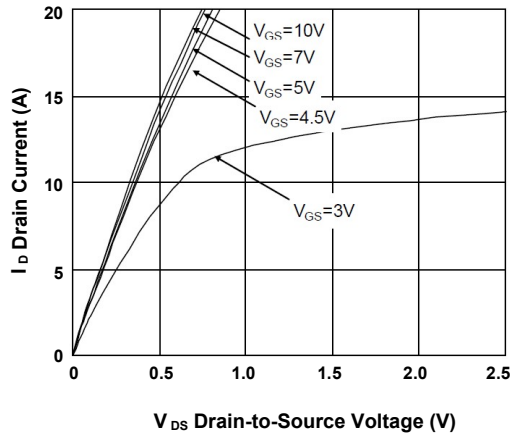

FIG.1-Typical Output Characteristics

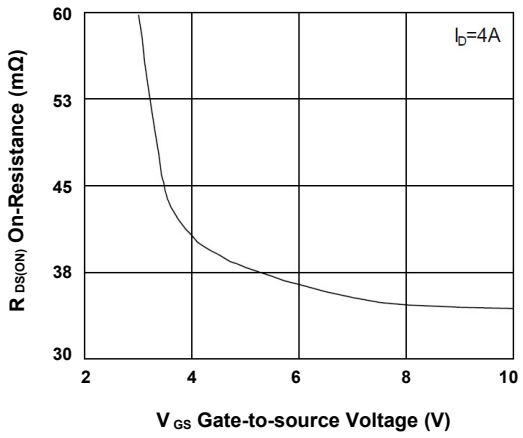

FIG.2-On-Resistance vs. G-S Voltage

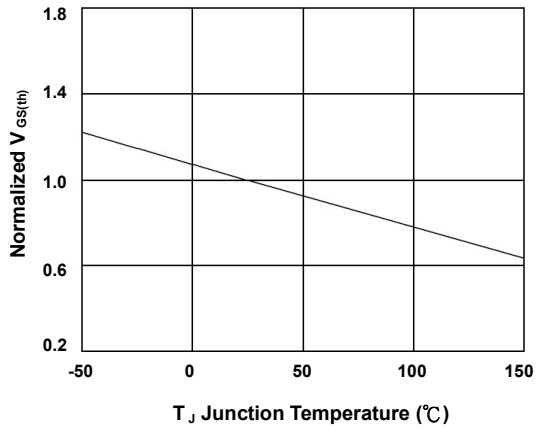

FIG.3-Normalized $V_{GS(th)}$ vs. T_J

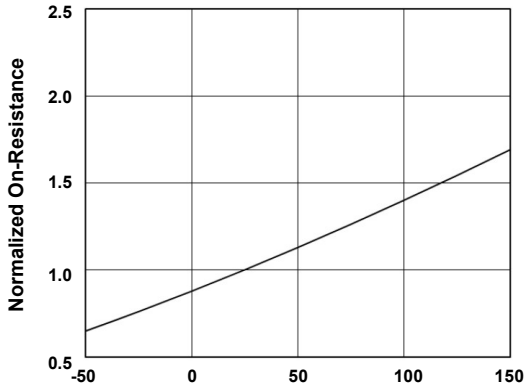

FIG.4-Normalized R_{DSON} vs. T_J

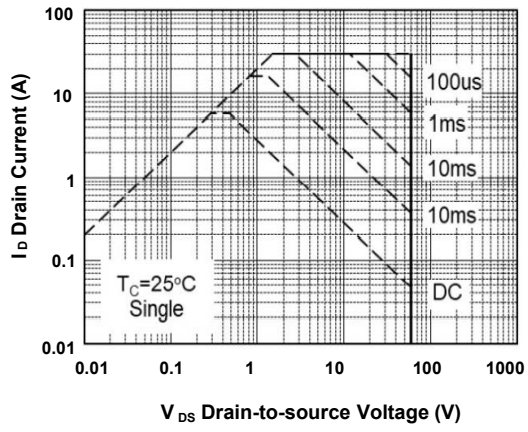

FIG.5-Safe Operating Area

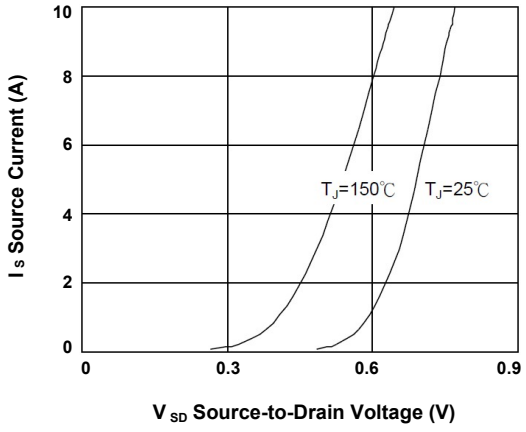

FIG.6-Forward Characteristics of Reverse

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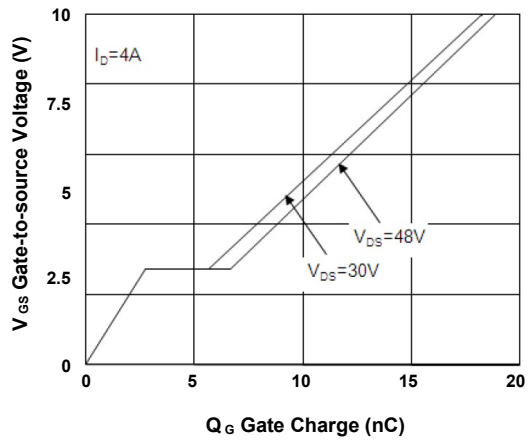

FIG.7-Gate Charge Characteristics

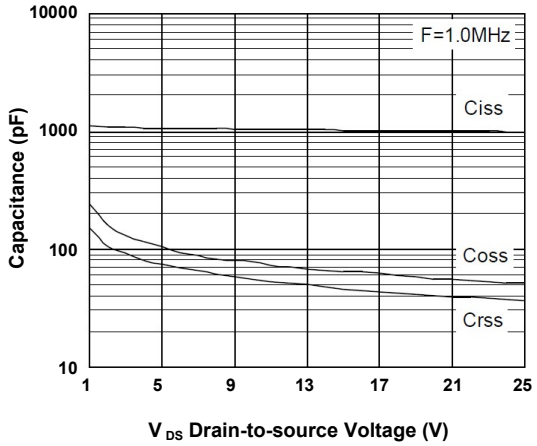

FIG.8-Capacitance Characteristics

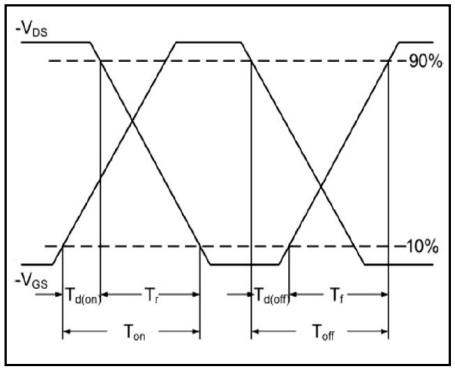

FIG.9-Switching Time Waveform

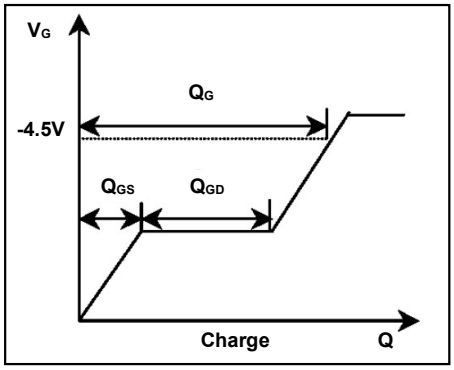

FIG.10-Gate Charge Waveform

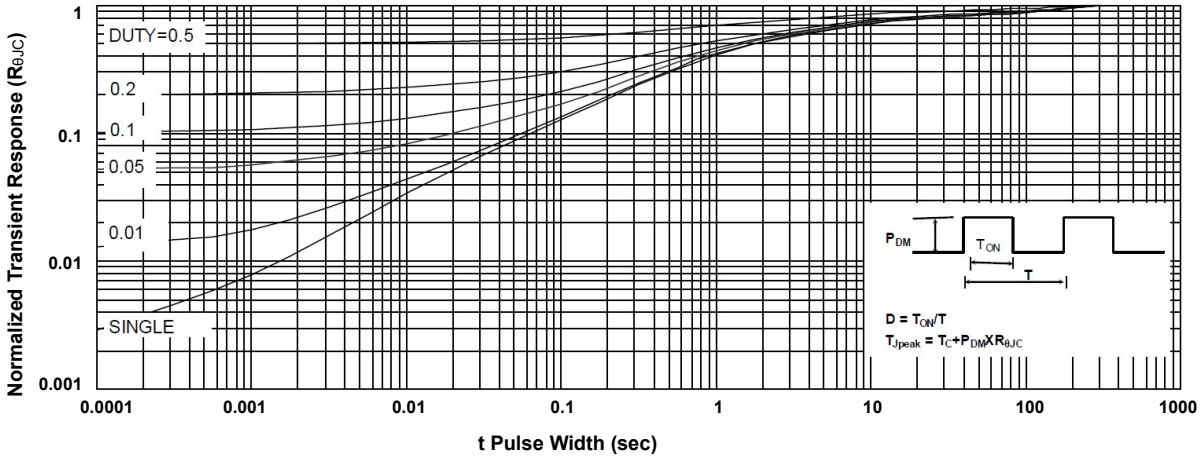

FIG.11-Normalized Maximum Transient Thermal Impedance

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