MSD60N085

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

Description

The device is using trench DMOS technology. This advanced technology has been especially tailored to minimize $R_{DS(ON)}$, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

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

Features

- $R_{DS(ON)}$ =8.5mΩ @ V_{GS} =10V
- Super Low Gate Charge
- Green Device Available

Typical Applications

- Motor Control
- DC/DC Converter
- Synchronous rectifier applications

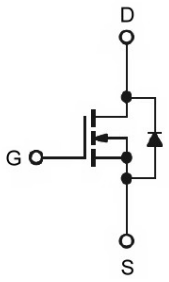
Package type：TO-252

Packing & Order Information

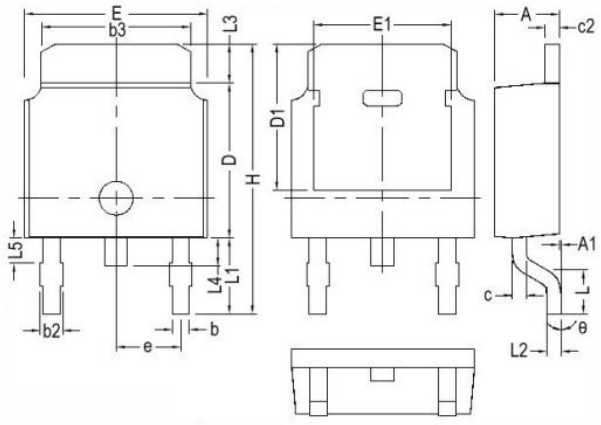
2,500/Reel

RoHS Compliant

Graphic Symbol

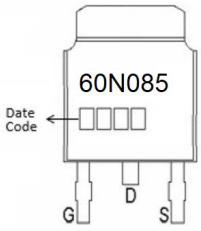


Package Dimension



REF.	Millimeter			REF.	Millimeter		
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	2.20	2.30	2.38	E1	4.40	-	-
A1	0	-	0.127	e	2.286 BSC		
b	0.64	0.76	0.88	H	9.40	10.00	10.40
b2	0.77	0.84	1.14	L	1.40	1.52	1.77
b3	5.21	5.34	5.46	L1	2.743 Ref.		
c	0.45	0.50	0.60	L2	0.508 BSC		
c2	0.45	0.50	0.58	L3	0.89	-	1.27
D	6.00	6.10	6.223	L4	0.64	-	1.01
D1	5.21	-	-	L5	-	-	-
E	6.40	6.60	6.731	θ	0°	-	10°

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)			
Symbol	**Parameter**	**Value**	**Unit**
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current @ T_C=25°C	58	A
	Continuous Drain Current @ T_C=100°C	37	A
I_{DM}	Pulsed Drain Current[2]	250	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 (T_C=25°C)	50	W
T_j, T_{stg}	Operating Junction and Storage Temperature	-55~+150	°C

Thermal Resistance Ratings			
Symbol	**Parameter**	**Value**	**Unit**
$R_{\theta JA}$	Maximum Junction-to-Ambient[1]	60	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case	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	-	2.3	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	-	-	1	μA
		V_{DS} =48V, V_{GS} =0V, T_J =55°C			5	
$R_{DS\ (on)}$	Static Drain-Source On-Resistance[2]	V_{GS} =10V, I_D =15A	-	7	8.5	mΩ
		V_{GS} =4.5V, I_D =15A	-	10.5	12.5	
EAS	Single Pulse Avalanche Energy[5]	V_{DD} =50V, L =0.1mH, I_{AS} =11A	6	-	-	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	-	-	30	A
I_{SM}	Pulsed Source Current[2,6]		-	-	58	

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Dynamic						
Symbol	**Parameter**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Q_g	Total Gate Charge[2]	V_{DS} =30V	--	15	--	nC
Q_{gs}	Gate-Source Charge	I_D =15A	--	3.5	--	
Q_{gd}	Gate-Drain Charge	V_{GS} =10V	--	4.2	--	
$t_{d(on)}$	Turn-On Delay Time[2]	V_{DS} =30V	--	7	--	ns
t_r	Rise Time	I_D =15A	--	4.5	--	
$t_{d(off)}$	Turn-Off Delay Time	V_{GS} =10V	--	26	--	
t_f	Fall Time	R_G =3.3Ω	--	5	--	
C_{ISS}	Input Capacitance	V_{DS} =30V	--	1270	--	pF
C_{OSS}	Output Capacitance	V_{GS} =0V	--	479	--	
C_{RSS}	Reverse Transfer Capacitance	f =1.0MHz	--	40	--	
trr	Reverse Recovery Time	I_F=15A, dI/dt=100A/μs, T_j=25°C	--	22	--	nS
Qrr	Reverse Recovery Charge		--	72	--	nC
Rg	Gate Resistance	V_{DS} =0V, V_{GS} =0V, f =1.0MHz	--	1.3	--	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 V_{DD}=50V, 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**

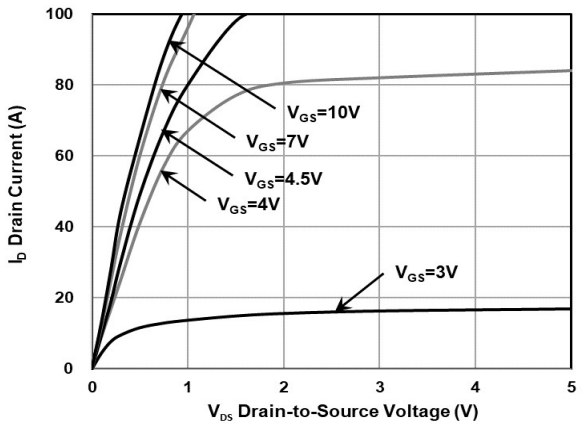

FIG.1-Typical Output Characteristics

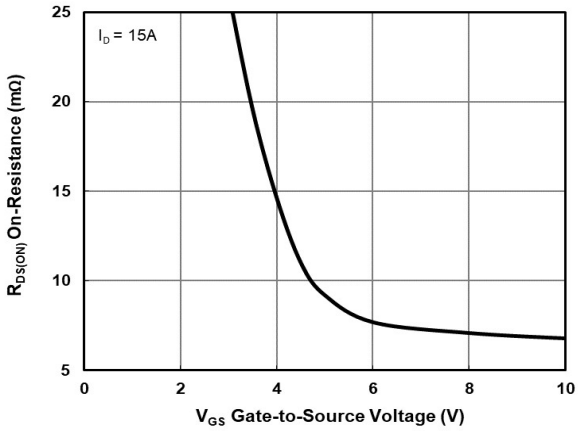

FIG.2-On-Resistance vs. G-S Voltage

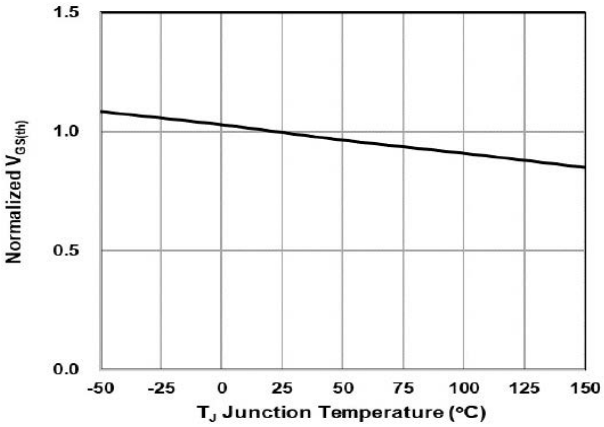

FIG.3-Normalized $V_{GS(th)}$ vs. T_J

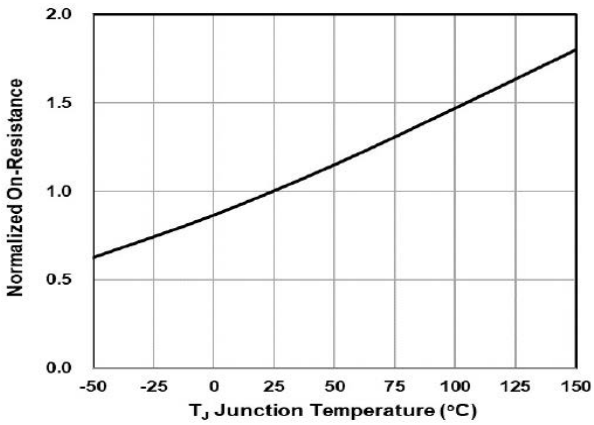

FIG.4-Normalized R_{DSON} vs. T_J

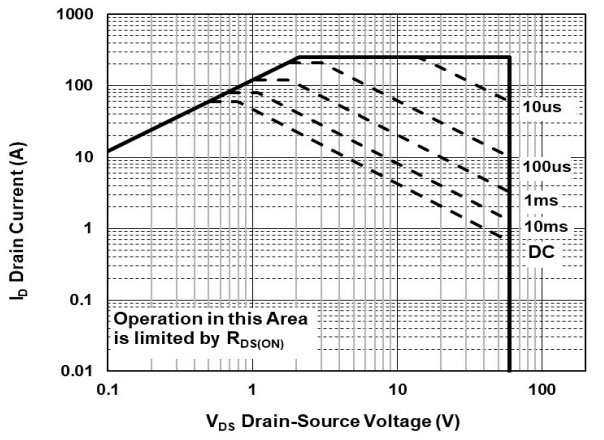

FIG.5-Safe Operating Area

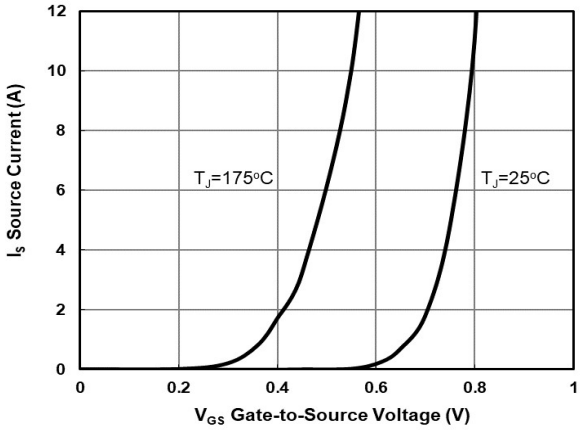

FIG.6-Source Drain Forward Characteristics

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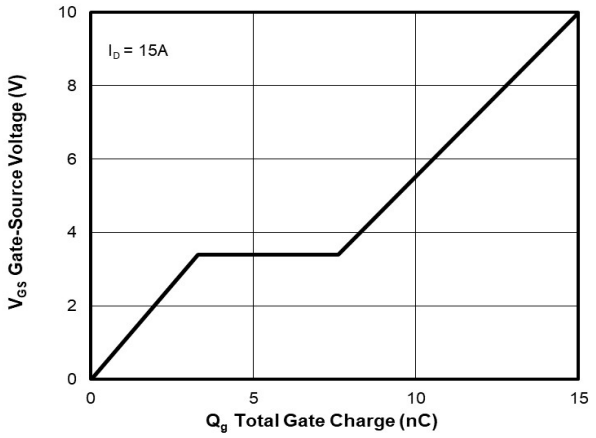

FIG.7-Gate Charge Characteristics

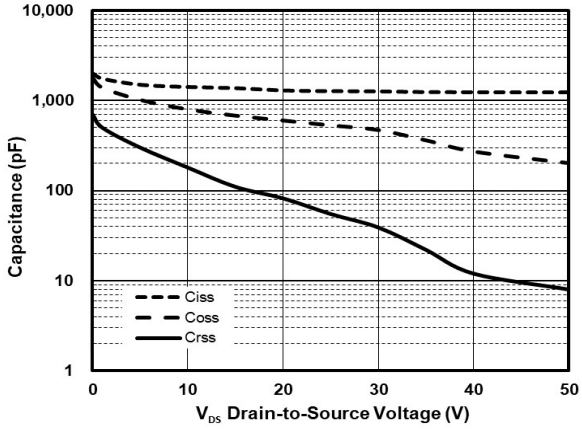

FIG.8-Capacitance Characteristics

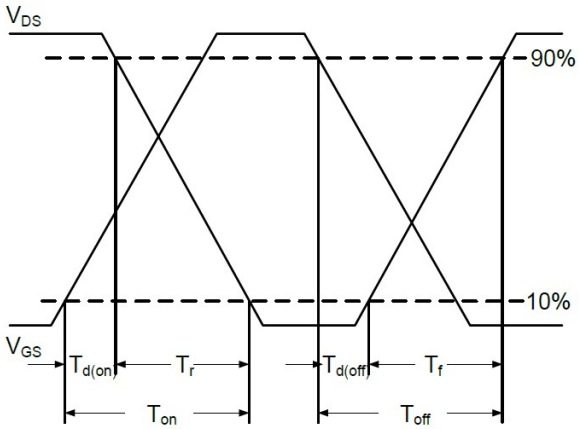

FIG.9-Switching Time Waveform

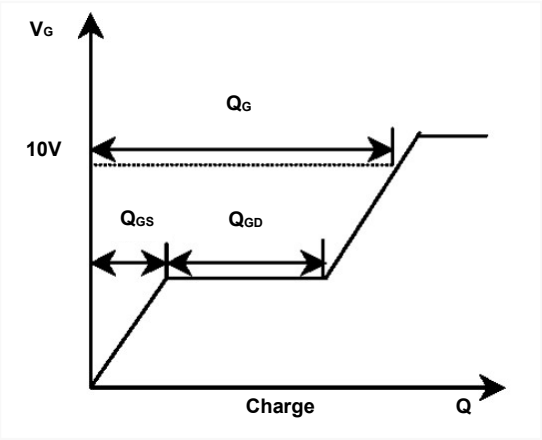

FIG.10- Gate Charge Waveform

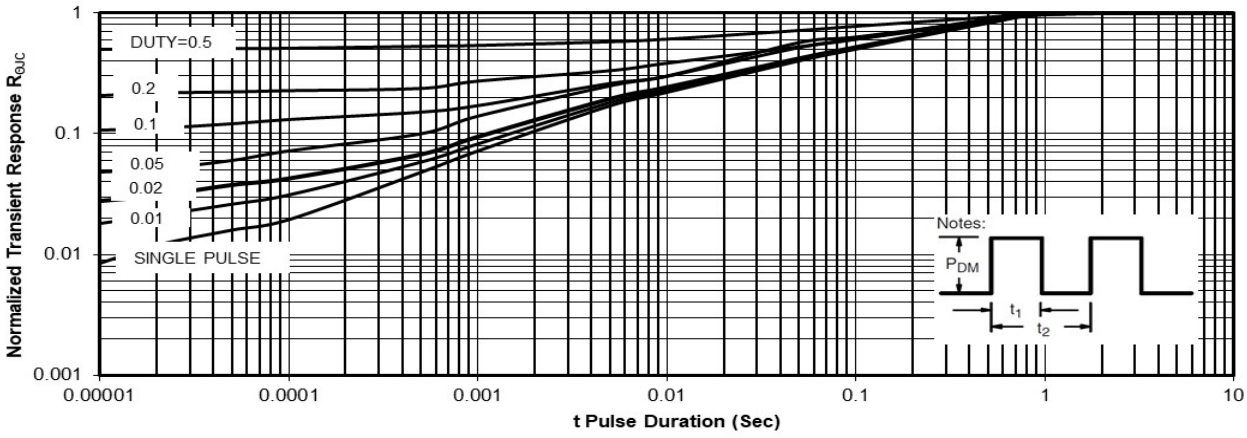

FIG.11-Normalized Maximum Transient Thermal Impedance

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