



## Dual P-Ch 60V Fast Switching MOSFETs

### Description

The HSM6303 is the high cell density trenched P-ch MOSFETs, which provide excellent R<sub>DS(ON)</sub> and gate charge for most of the synchronous buck converter applications.

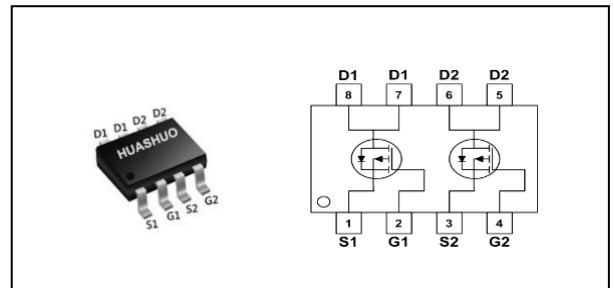
The HSM6303 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

### Product Summary

V <sub>DS</sub>	-60	V
R <sub>DS(ON),TYP</sub>	58	mΩ
I <sub>D</sub>	-4	A

### SOP8 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-60	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub> @T <sub>A</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ -10V <sub>1</sub>	-4	A
I <sub>D</sub> @T <sub>A</sub> =70°C	Continuous Drain Current, V <sub>GS</sub> @ -10V <sub>1</sub>	-3	A
I <sub>DM</sub>	Pulsed Drain Current <sub>2</sub>	-7.5	A
EAS	Single Pulse Avalanche Energy <sub>3</sub>	35.4	mJ
I <sub>AS</sub>	Avalanche Current	-26.6	A
P <sub>D</sub> @T <sub>A</sub> =25°C	Total Power Dissipation <sub>4</sub>	1.5	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sub>1</sub>	---	85	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sub>1</sub>	---	36	°C/W



**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-60	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.03	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sub>2</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-3A	---	58	70	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2A	---	75	105	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.2	---	-2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	4.56	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-3A	---	15	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	13.5	---	Ω
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-48V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A	---	9.86	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	3.08	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.95	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-1A	---	28.8	---	ns
T <sub>r</sub>	Rise Time		---	19.8	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	60.8	---	
T <sub>f</sub>	Fall Time		---	7.2	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	1447	---	pF
C <sub>oss</sub>	Output Capacitance		---	97.3	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	70	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sub>1,5</sub>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-3.7	A
I <sub>SM</sub>	Pulsed Source Current <sub>2,5</sub>		---	---	-7.5	A
V <sub>SD</sub>	Diode Forward Voltage <sub>2</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.2	V

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> 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 . The test condition is V<sub>DD</sub>=-25V,V<sub>GS</sub>=-10V,L=0.1mH,I<sub>AS</sub>=-26.6A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



Typical Characteristics

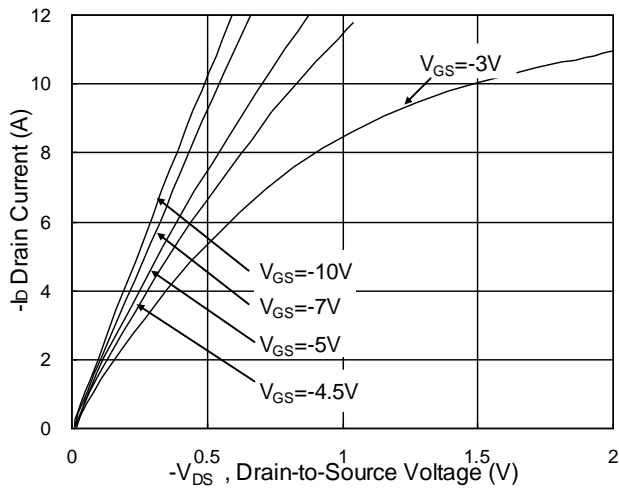


Fig.1 Typical Output Characteristics

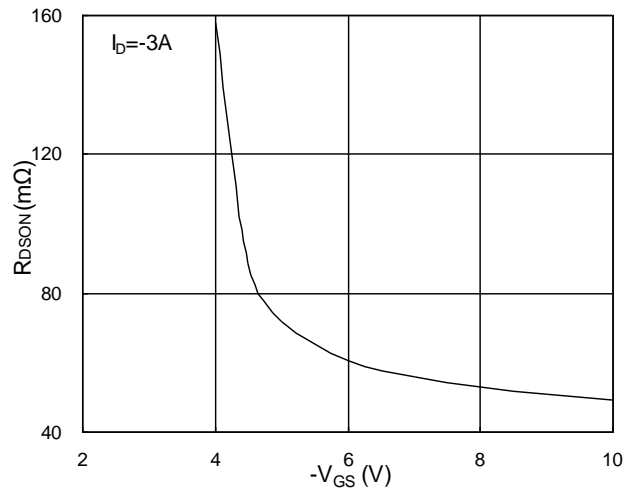


Fig.2 On-Resistance vs G-S Voltage

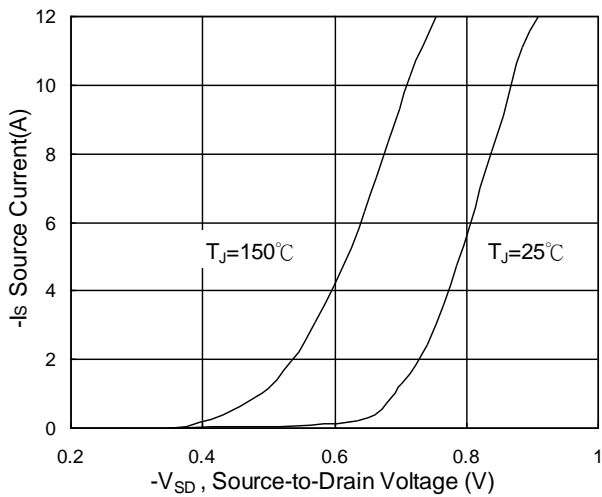


Fig.3 Source Drain Forward Characteristics

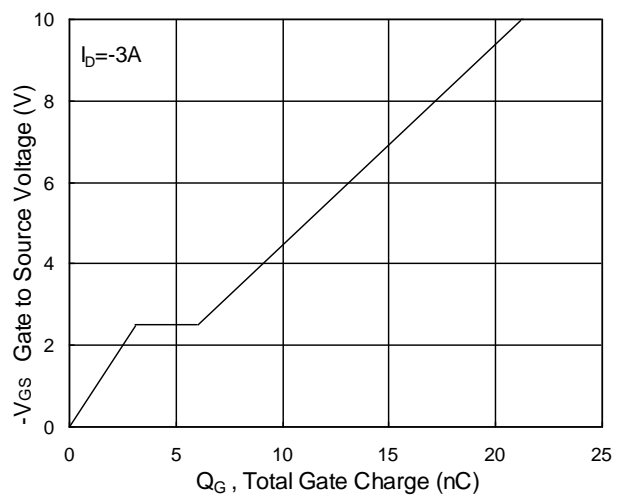


Fig.4 Gate-Charge Characteristics

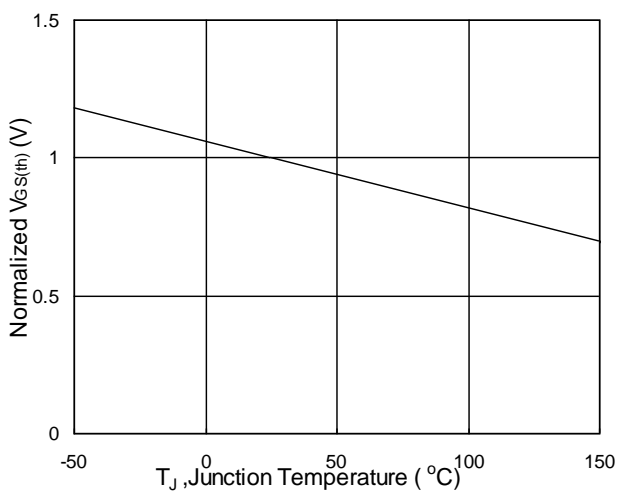


Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$

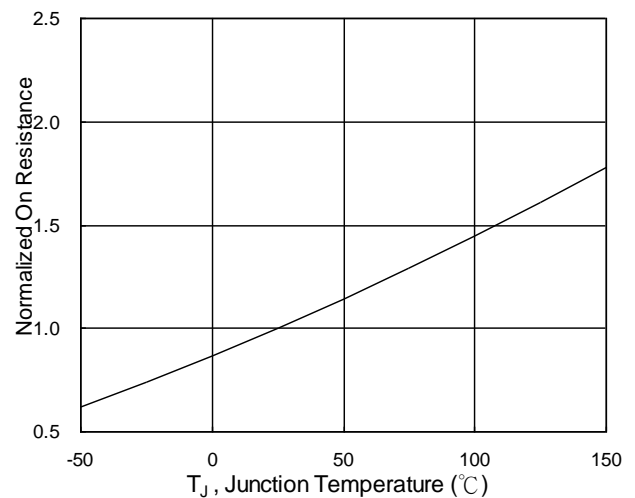
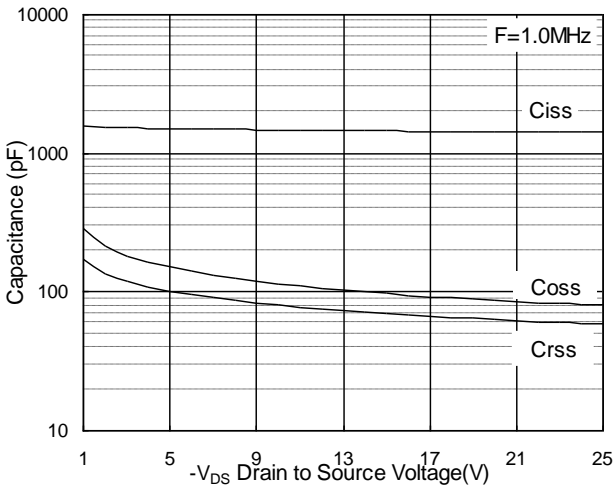


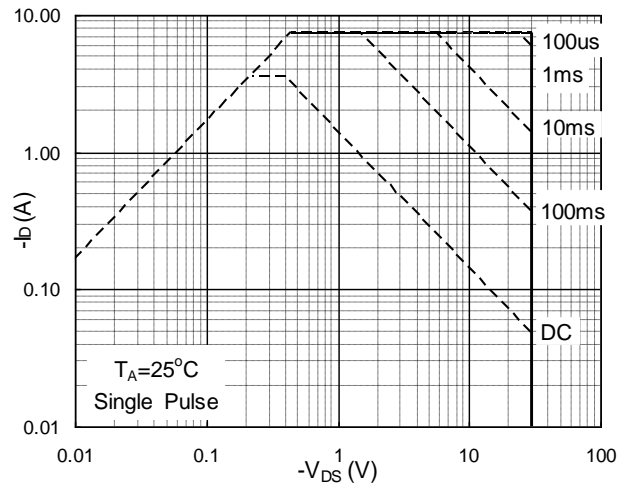
Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$



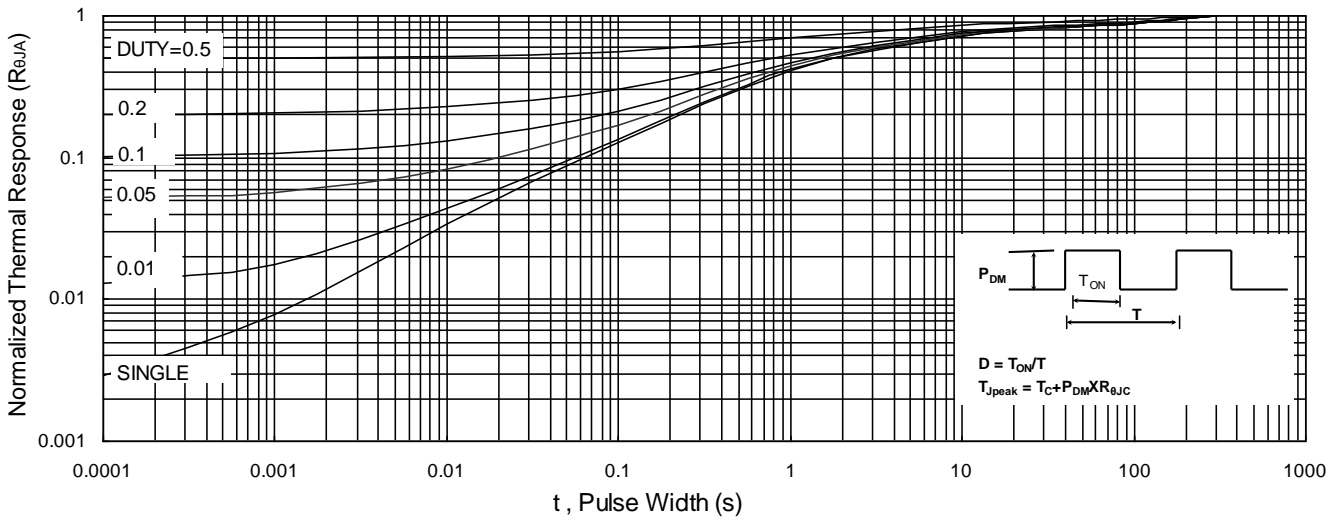
**Dual P-Ch 60V Fast Switching MOSFETs**



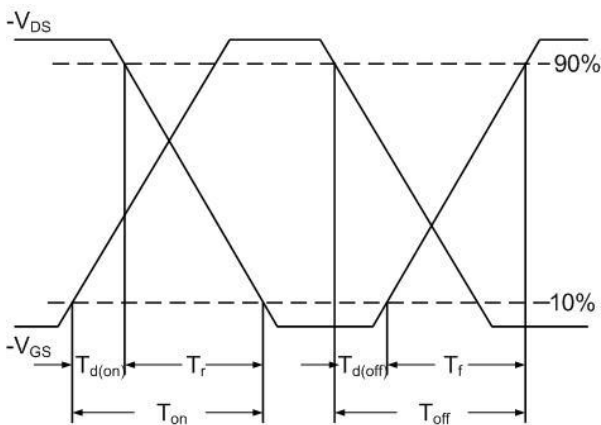
**Fig.7 Capacitance**



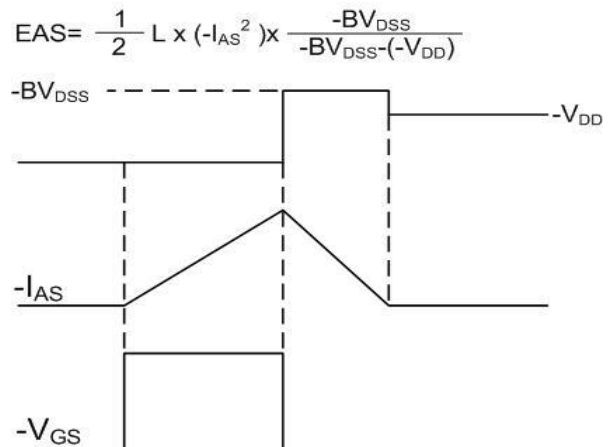
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Waveform**



## Ordering Information

Part Number	Package code	Packaging
HSM6303	SOP-8	2500/Tape&Reel

