

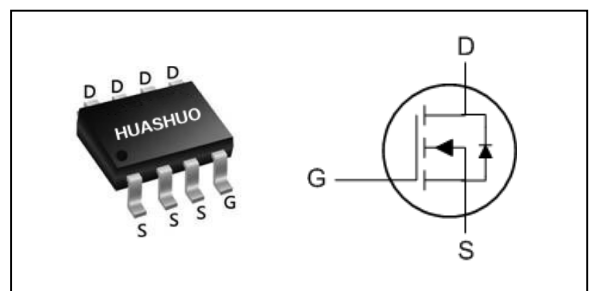
N-Ch 100V Fast Switching MOSFETs
Description

The HSM0094 is the high cell density trench N-ch MOSFETs, which provide excellent $R_{DS(ON)}$ and gate charge for most of the Synchronous Rectification for AC/DC Quick Charger.

- ★ 100% EAS Guaranteed
- ★ Low $R_{DS(ON)}$
- ★ Low Gate Charge
- ★ RoHs and Halogen-Free Compliant

Product Summary

V_{DS}	100	V
$R_{DS(ON),max}$	12	m Ω
I_D	11.5	A

SOP8 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_A=25^\circ C$	Continuous Drain Current ¹	11.5	A
$I_D@T_A=70^\circ C$	Continuous Drain Current ¹	9	A
I_{DM}	Pulsed Drain Current ²	46	A
EAS	Single Pulse Avalanche Energy ³	12	mJ
I_{AS}	Avalanche Current	9	A
$P_D@T_A=25^\circ C$	Total Power Dissipation ⁴	3.1	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ ($t \leq 10s$)	---	40	$^\circ C/W$
	Thermal Resistance Junction-Ambient ¹	---	75	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	24	$^\circ C/W$



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	100	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=11.5A$	---	9	12	$m\Omega$
	Static Drain-Source On-Resistance ²	$V_{GS}=4.5V, I_D=9.5A$	---	12	15.5	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	---	2.3	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=80V, V_{GS}=0V, T_J=25^\circ C$	---	---	1	μA
		$V_{DS}=80V, V_{GS}=0V, T_J=55^\circ C$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=5V, I_D=11.5A$	---	45	---	S
Q_g	Total Gate Charge (10V)	$V_{DS}=50V, V_{GS}=10V, I_D=11.5A$	---	35	---	nC
Q_g	Total Gate Charge (4.5V)		---	16	---	
Q_{gs}	Gate-Source Charge		---	8	---	
Q_{gd}	Gate-Drain Charge		---	4	---	
$T_d(on)$	Turn-On Delay Time	$V_{DD}=50V, V_{GS}=10V, R_G=3\Omega, I_D=11.5A$	---	9	---	ns
T_r	Rise Time		---	4.5	---	
$T_d(off)$	Turn-Off Delay Time		---	35	---	
T_f	Fall Time		---	5.5	---	
C_{iss}	Input Capacitance	$V_{DS}=50V, V_{GS}=0V, f=1MHz$	---	2550	---	pF
C_{oss}	Output Capacitance		---	305	---	
C_{rss}	Reverse Transfer Capacitance		---	12	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V, \text{Force Current}$	---	---	4	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	---	---	1.1	V
t_{rr}	Reverse Recovery Time	$I_F=11.5A, di/dt=100A/\mu s,$	---	28	---	nS
Q_{rr}	Reverse Recovery Charge	$T_J=25^\circ C$	---	120	---	nC

Note :

- 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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.3mH, I_{AS}=9A$
- 4.The power dissipation is limited by 150°C 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 Characteristics

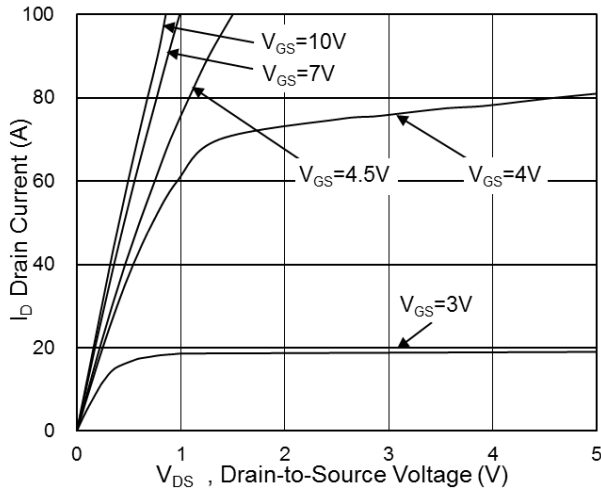


Fig.1 Typical Output Characteristics

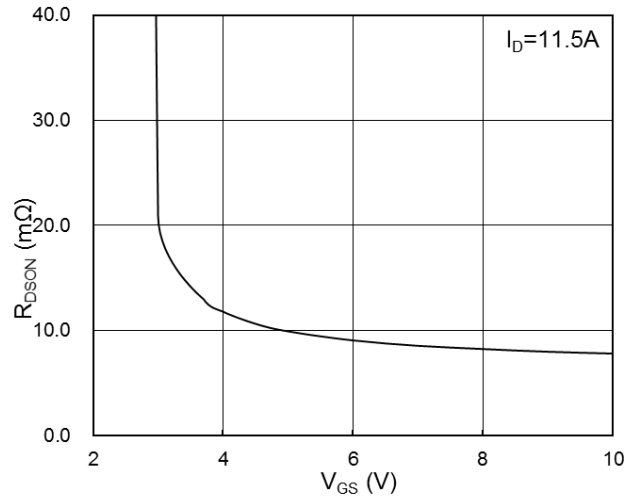


Fig.2 On-Resistance vs. G-S Voltage

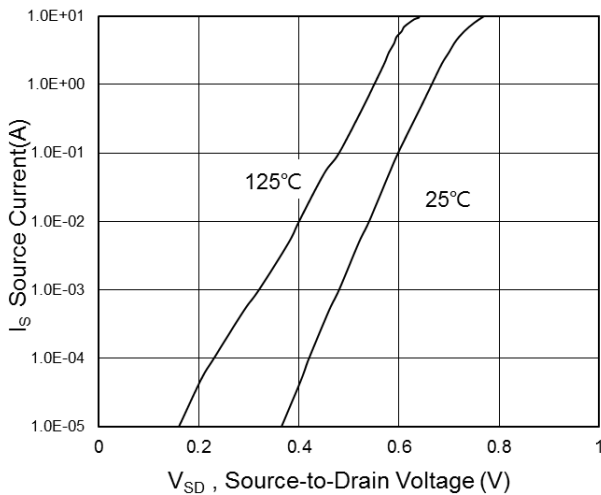


Fig.3 Source-Drain Forward Characteristics

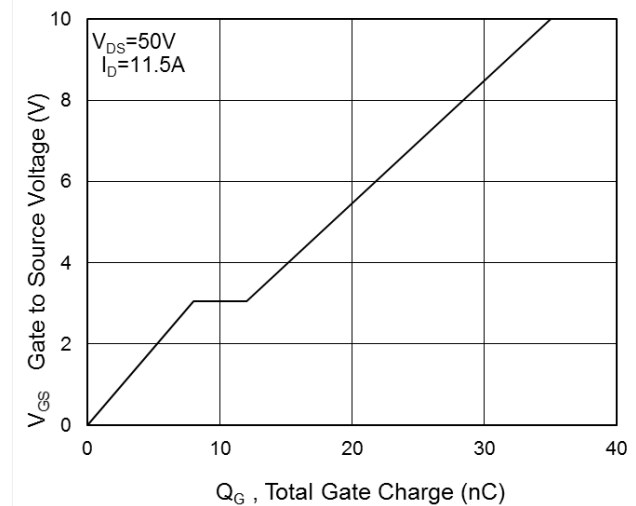


Fig.4 Gate-Charge Characteristics

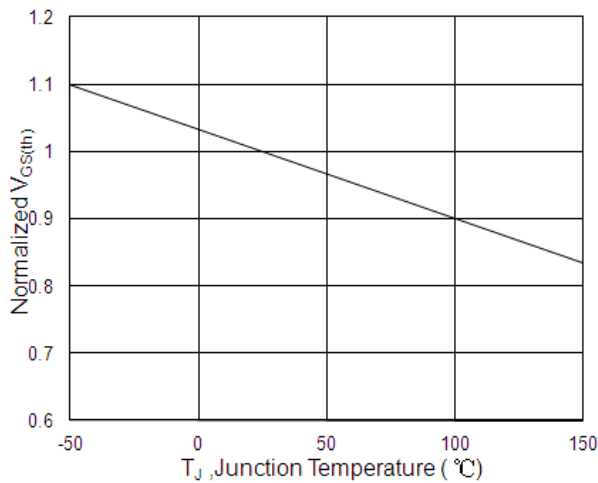


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

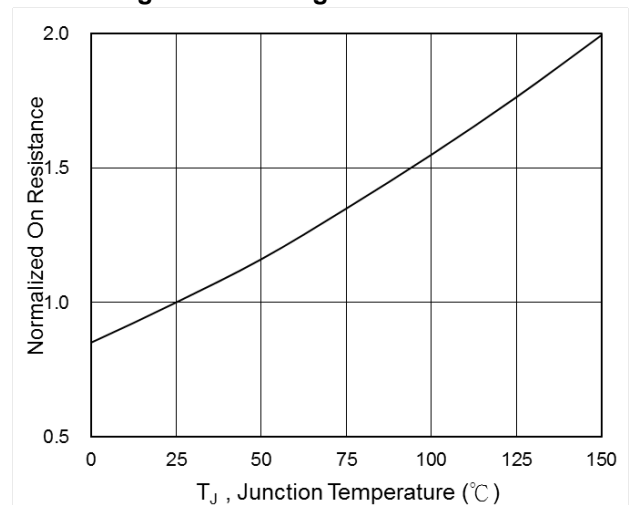


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



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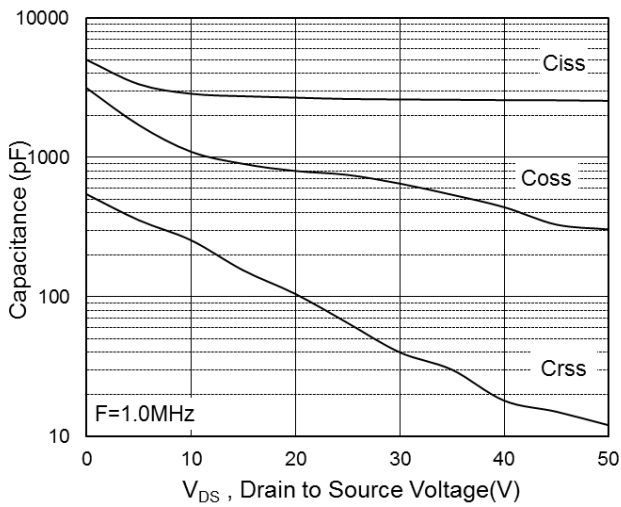


Fig.7 Capacitance

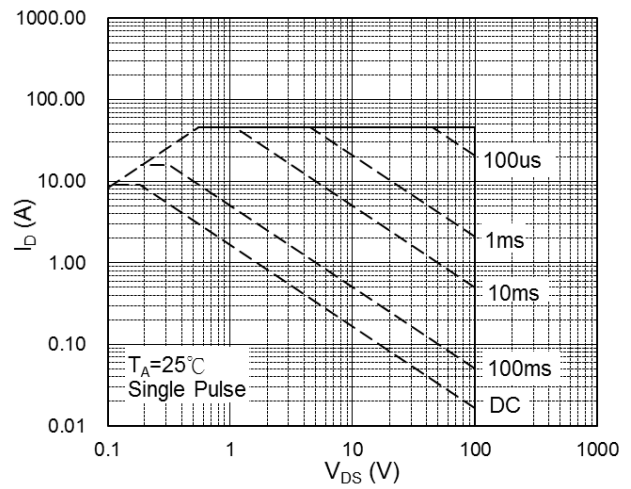


Fig.8 Safe Operating Area

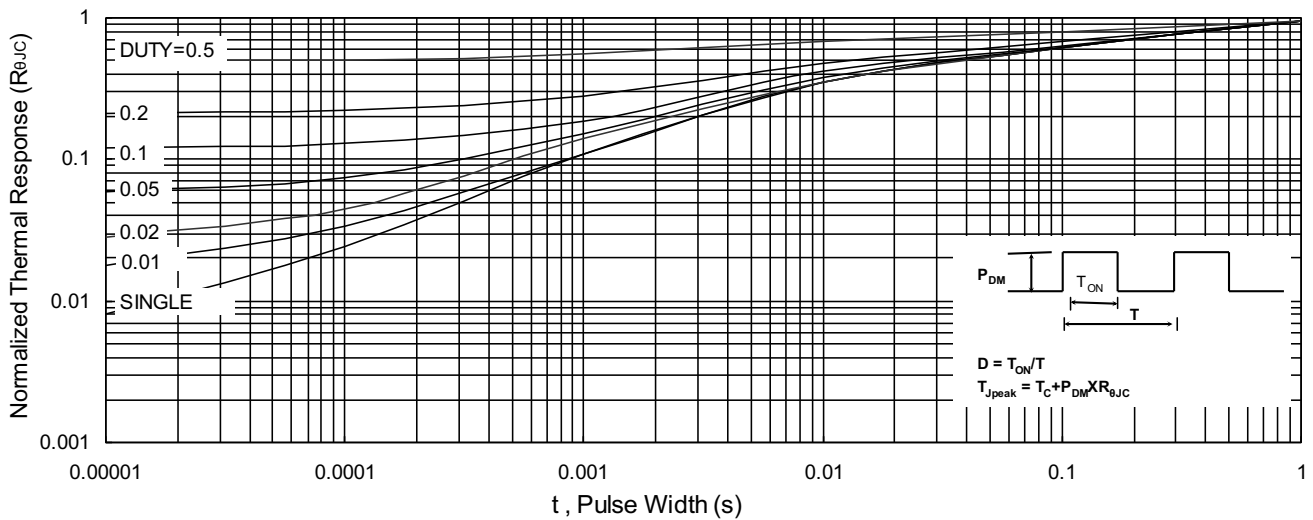


Fig.9 Normalized Maximum Transient Thermal Impedance

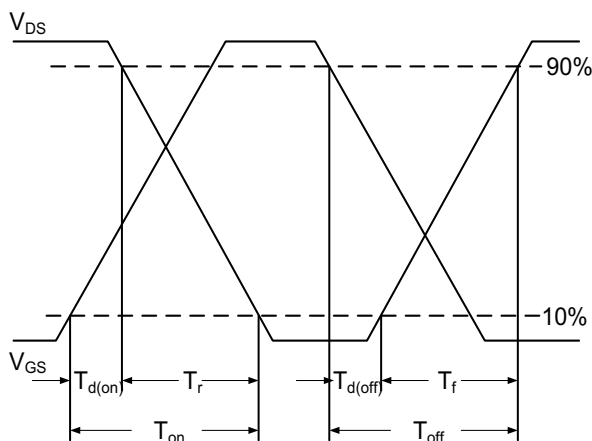


Fig.10 Switching Time Waveform

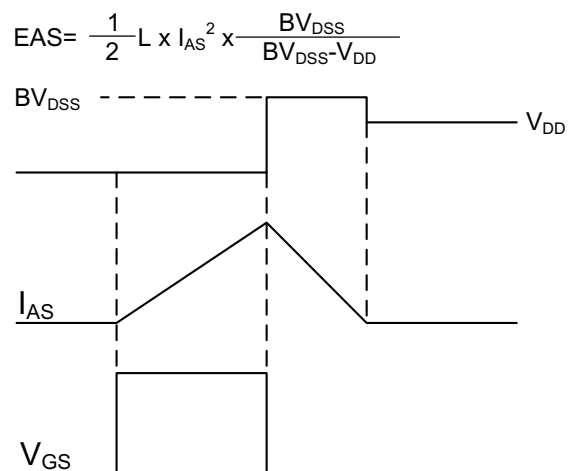


Fig.11 Unclamped Inductive Switching Waveform



Ordering Information

Part Number	Package code	Packaging
HSM0094	SOP-8	2500/Tape&Reel

