

FH1204S

N-Channel Enhancement Mode Power MOSFET

◆ General Description

The FH1204S uses advanced Super trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

◆ Application

- Motor drivers
- DC/DC Converters In Computing

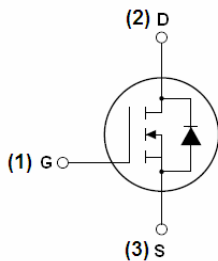
◆ Features

- $BV_{DSS} = 40V$, $ID = 20A$

$$R_{DS(ON)} = 7 \text{ m}\Omega \text{ (Typ)} @ V_{GS} = 10 \text{ V}$$

$$R_{DS(ON)} = 9 \text{ m}\Omega \text{ (Typ)} @ V_{GS} = 4.5 \text{ V}$$

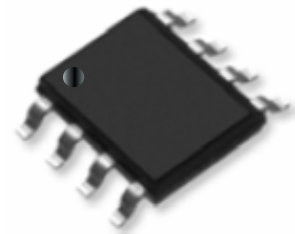
- Surface - mounted package
- Super Trench
- Low Thermal Resistance
- Low ciss



Schematic diagram



Marking and pin assignment



SO-8 top view

Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	$T_C = 25^\circ\text{C}$	40	-	V
V_{GS}	Gate-Source Voltage	$T_C = 25^\circ\text{C}$	-	± 20	V
I_D^*	Drain Current	$T_C = 25^\circ\text{C}$, $V_{GS} = 10 \text{ V}$	-	20	A
I_{DM}^{****}	Pulsed Source Current	$T_C = 25^\circ\text{C}$, $V_{GS} = 10 \text{ V}$	-	80	A
P_{tot}^*	Total Power Dissipation	$T_C = 25^\circ\text{C}$	-	2.8	W
T_{stg}	Storage Temperature		- 55	150	$^\circ\text{C}$
T_J	Junction Temperature		-	150	$^\circ\text{C}$
I_S	Diode Forward Current	$T_C = 25^\circ\text{C}$	-	20	A
E_{AS}^*	Single Pulsed Avalanche Energy	$V_{DD} = 40 \text{ V}$, $L = 0.5 \text{ mH}$	-	40	mJ
$R_{\theta JA}^*$	Thermal Resistance- Junction to Ambient		-	64	$^\circ\text{C} / \text{W}$
$R_{\theta JC}^*$	Thermal Resistance- Junction to Case		-	8.5	

Notes :

* Surface Mounted on 1 in² pad area, $t \leq 10 \text{ sec}$

** Pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$

*** limited by bonding wire

Electrical Characteristics ($T_A=25^\circ$ Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	40	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	1.2	-	2.2	V
I _{DSS}	Zero Gate Voltage Source Current	V _{DS} = 40 V, V _{GS} = 0 V	-	-	1	μA
		T _J = 85 °C	-	-	30	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ± 20 V, V _{DS} = 0 V	-	-	± 100	nA
R _{DS(ON)} ^a	Drain-Source On-State Resistance	V _{GS} = 10 V, I _D = 10 A	-	7	9	mΩ
		V _{GS} = 4.5 V, I _D = 6 A	-	9	13	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 10 A, V _{GS} = 0 V	-	-	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} = 10 A, dI _{SD} /dt = 100 A/μs	-	26	-	nS
Q _{rr}	Reverse Recovery Charge		-	8.8	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V Frequency = 1 MHz	-	968	-	pF
C _{oss}	Output Capacitance		-	134	-	
C _{rss}	Reverse Transfer Capacitance		-	34	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 20 V, V _{GEN} = 10 V, R _G = 4.5 Ω, R _L = 1.12 Ω, I _D = 10 A	-	5.1	-	nS
t _r	Turn-on Rise Time		-	41	-	
t _{d(off)}	Turn-off Delay Time		-	14	-	
t _f	Turn-off Fall Time		-	7.4	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{GS} = 10 V, V _{DS} = 22.5 V, I _{DS} = 10 A	-	14	-	nC
Q _{gs}	Gate-Source Charge		-	3.1	-	
Q _{gd}	Gate-Drain Charge		-	2.9	-	

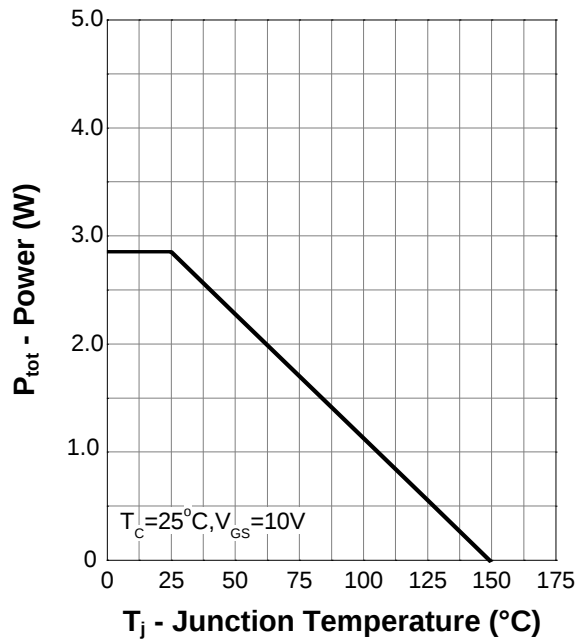
Notes :

a : Pulse test ; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

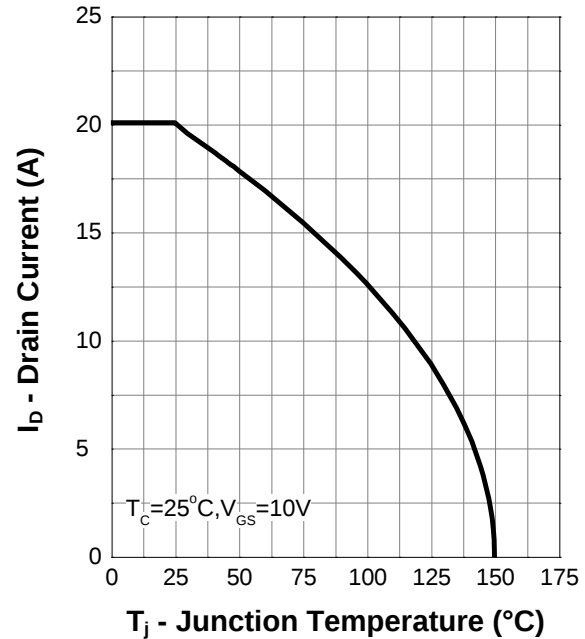
b : Guaranteed by design, not subject to production testing

Typical Characteristics (cont.)

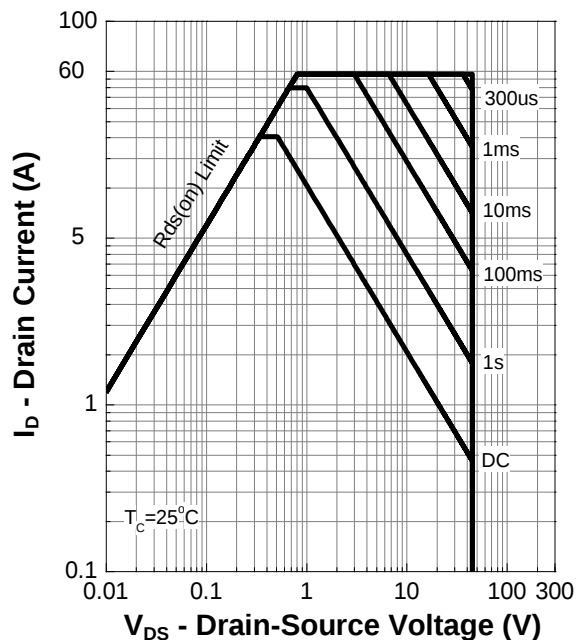
Power Capability



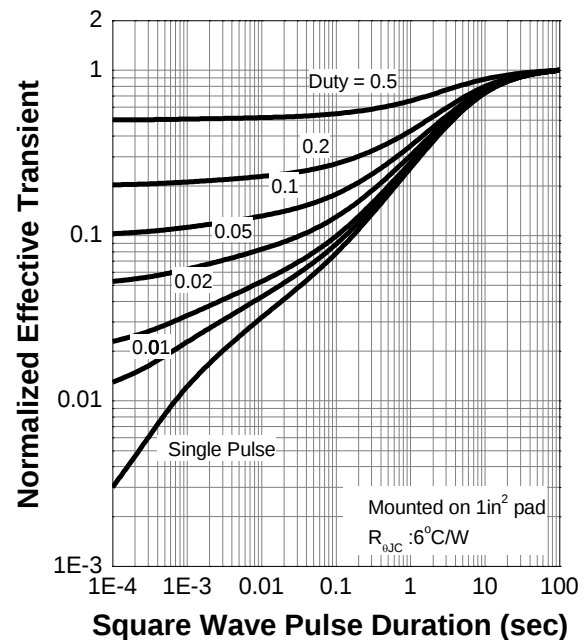
Current Capability



Safe Operating Area

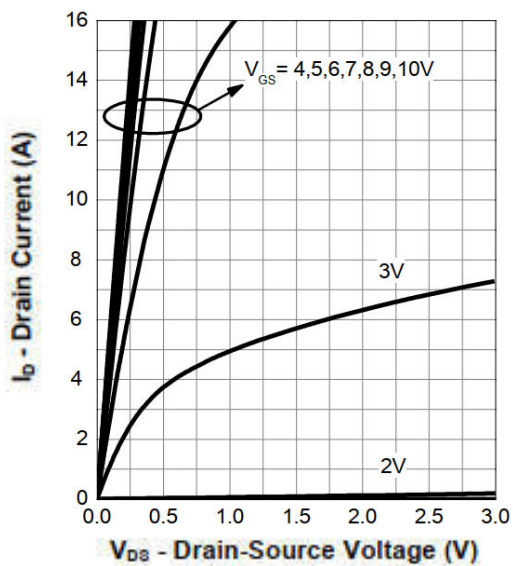


Transient Thermal Impedance

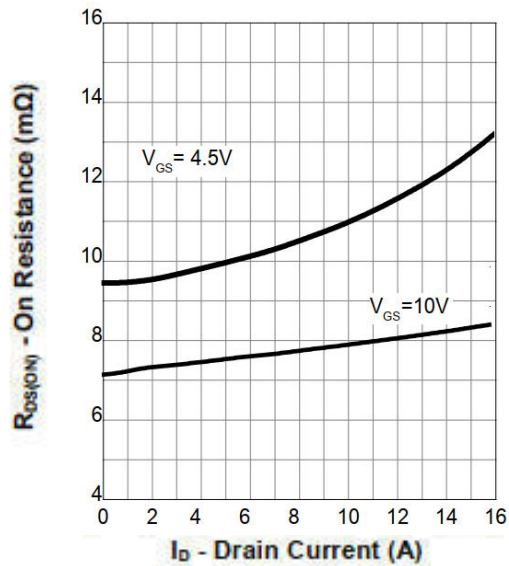


Typical Characteristics (cont.)

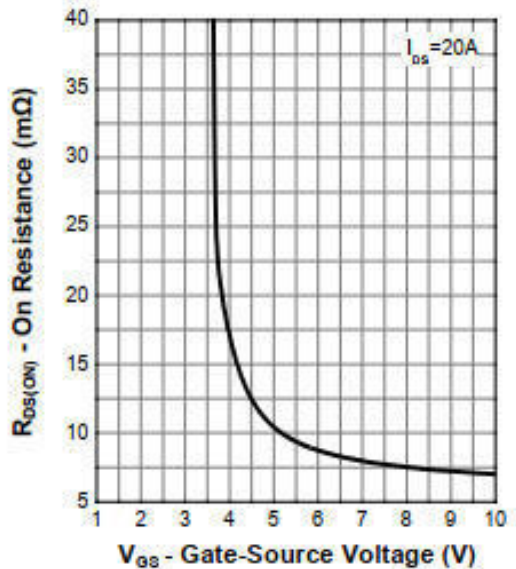
Output Characteristics



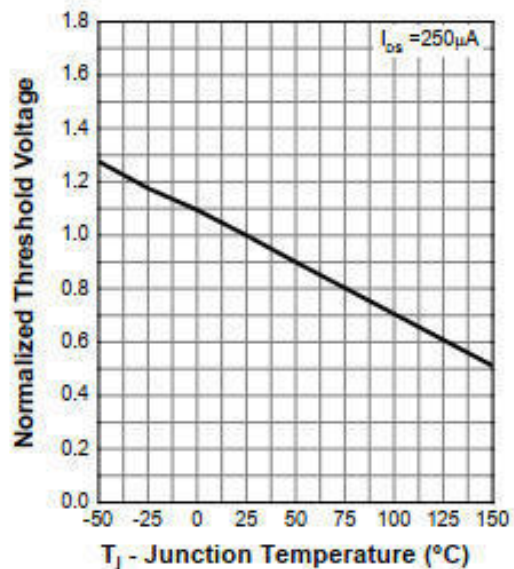
On Resistance



Transfer Characteristics

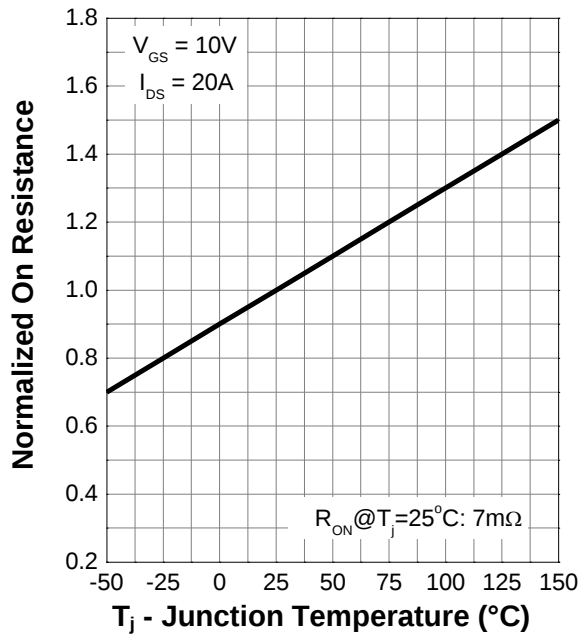


Normalized Threshold Voltage

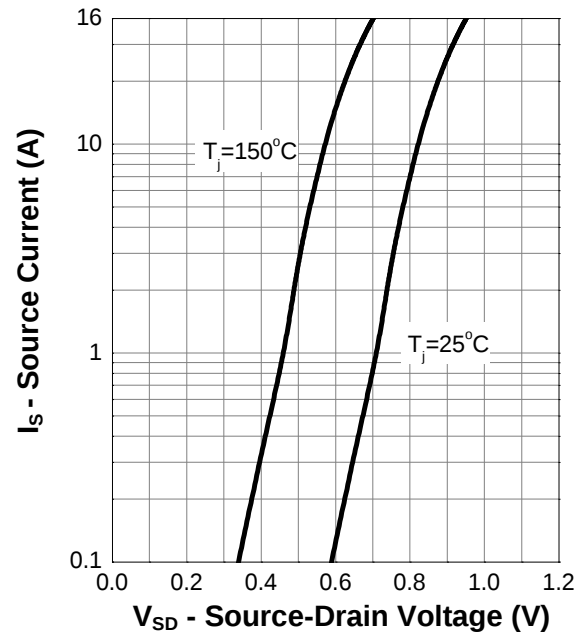


Typical Characteristics (cont.)

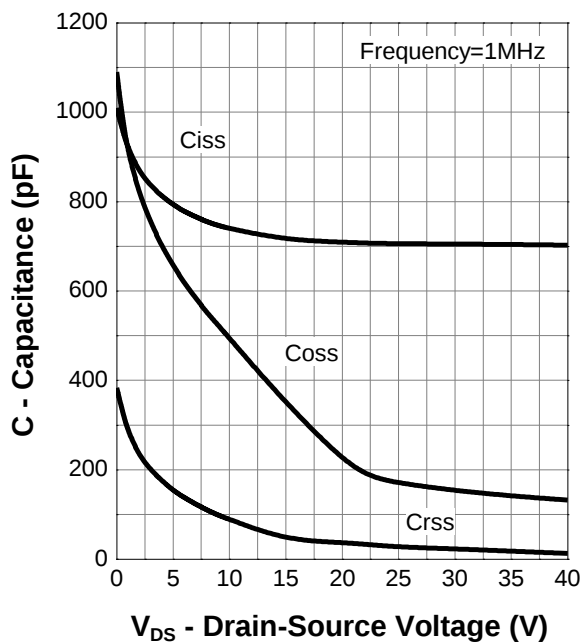
Normalized On Resistance



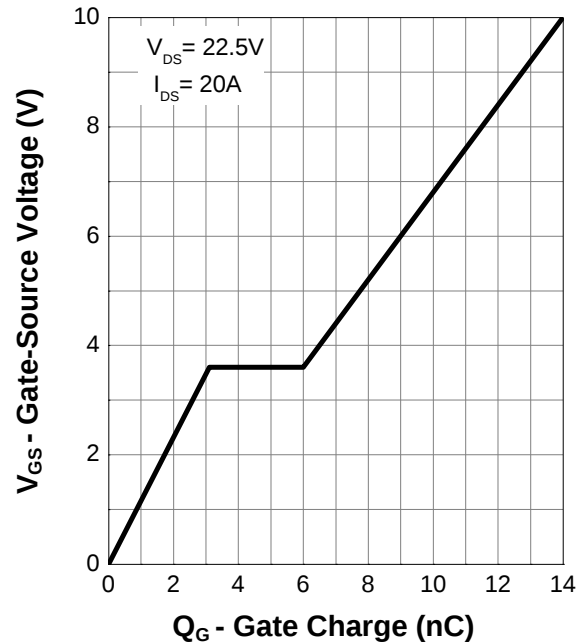
Diode Forward Current



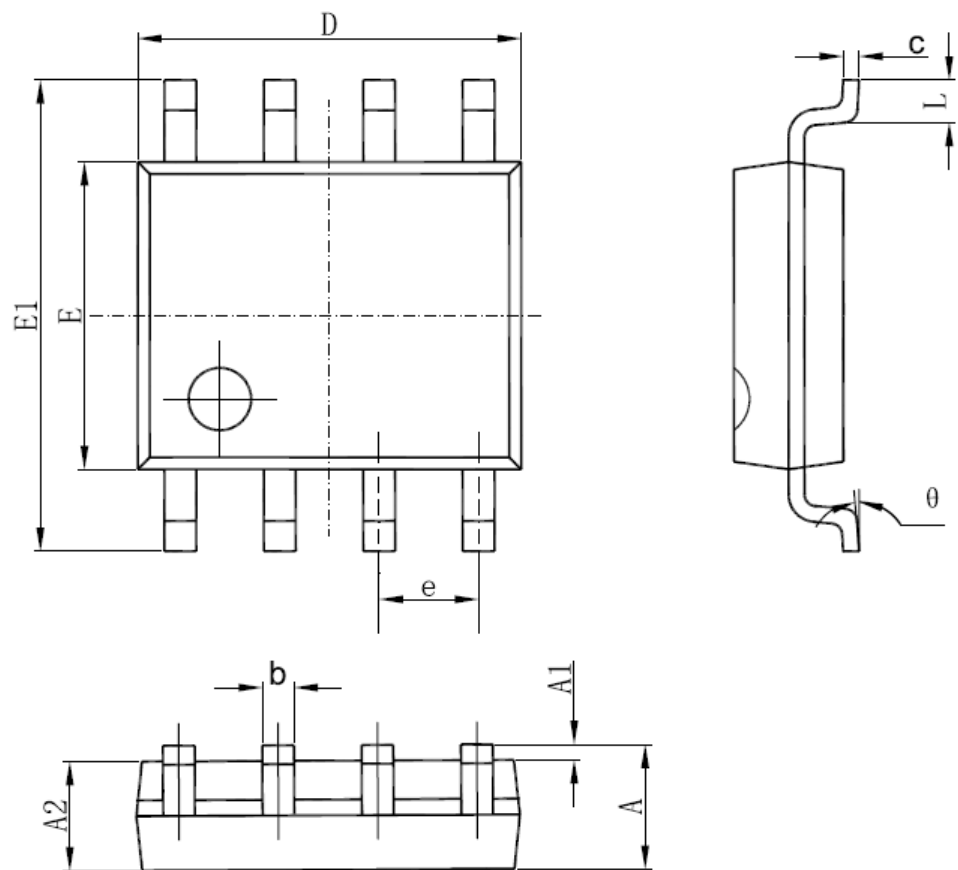
Capacitance



Gate Charge



Package Information : SO-8



SYMBOL	MM		INCH		SYMBOL	MM		INCH	
	MIN	MAX	MIN	MAX		MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069	E	3.800	4.000	0.150	0.157
A1	0.100	0.250	0.004	0.010	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	e	1.270 (BSC)		0.050 (BSC)	
b	0.330	0.510	0.013	0.020	L	0.400	1.270	0.016	0.050
c	0.170	0.250	0.006	0.010	θ	0°	8°	0°	8°
D	4.700	5.100	0.185	0.200					