

# FH1404G6

## N-Channel Enhancement Mode Power MOSFET

### Description

The FH1404G6 uses advanced 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

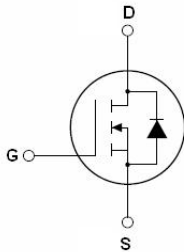
- Motor drivers
- DC/DC Converters In Computing

### General Features

$$R_{DS(ON)} \leq 8.5m\Omega @ V_{GS} = 10 V$$

$$R_{DS(ON)} \leq 12 m\Omega @ V_{GS} = 4.5 V$$

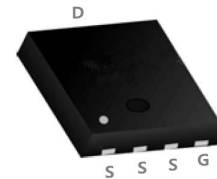
- Surface - mounted package
- Super Trench
- Low Thermal Resistance
- Low ciss



Schematic dia gram



Marking and pin Assignment



PDFN3.3x3.3-8L top and bottom view

## Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	Drain-Source Voltage	$T_C = 25\text{ }^\circ\text{C}$	40	-	V
$V_{GS}$	Gate-Source Voltage	$T_C = 25\text{ }^\circ\text{C}$	-	$\pm 20$	V
$I_D^*$	Drain Current	$T_C = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$	-	40	A
$I_{DM}^{****}$	Pulsed Source Current	$T_C = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$	-	120	A
$P_{tot}^*$	Total Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	-	20.8	W
$T_{stg}$	Storage Temperature		- 55	150	$^\circ\text{C}$
$T_J$	Junction Temperature		-	150	$^\circ\text{C}$
$I_S$	Diode Forward Current	$T_C = 25\text{ }^\circ\text{C}$	-	40	A
$E_{AS}^*$	Single Pulsed Avalanche Energy	$V_{DD} = 40\text{ V}, L = 0.5\text{ mH}$	-	48	mJ
$R_{\theta JA}^*$	Thermal Resistance- Junction to Ambient		-	61.8	$^\circ\text{C} / \text{W}$
$R_{\theta JC}^*$	Thermal Resistance- Junction to Case		-	6	

Notes :

- \* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$
- \*\* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$
- \*\*\* limited by bonding wire

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

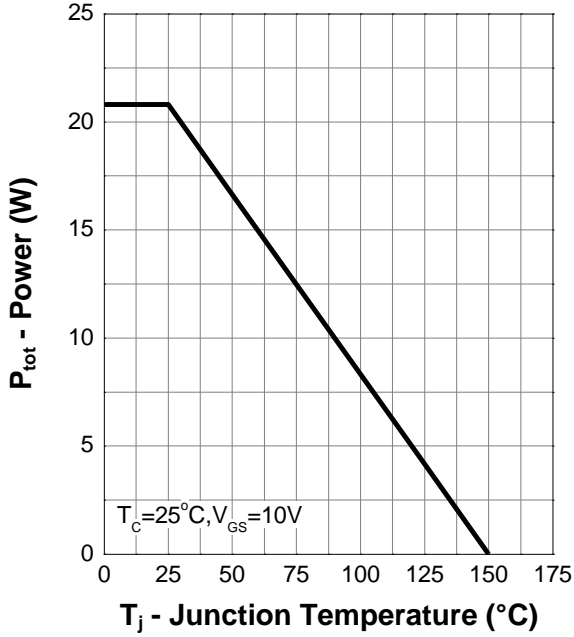
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	40	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = 250\ \mu\text{A}$	1	-	2	V
$I_{DSS}$	Zero Gate Voltage Source Current	$V_{DS} = 36\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$T_J = 85^\circ\text{C}$	-	-	30	$\mu\text{A}$
$I_{GSS}$	Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	-	-	$\pm 100$	nA
$R_{DS(ON)}^a$	Drain-Source On-State Resistance	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$	-	6.0	8.5	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$	-	8.0	12	
<b>Diode Characteristics</b>						
$V_{SD}^a$	Diode Forward Voltage	$I_{SD} = 20\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 20\text{ A}, dI_{SD}/dt = 100\text{ A}/\mu\text{s}$	-	26	-	nS
$Q_{rr}$	Reverse Recovery Charge		-	8.8	-	nC
<b>Dynamic Characteristics<sup>b</sup></b>						
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 22.5\text{ V}$ Frequency = 1 MHz	-	720	-	pF
$C_{oss}$	Output Capacitance		-	184	-	
$C_{rss}$	Reverse Transfer Capacitance		-	34	-	
$t_d(on)$	Turn-on Delay Time	$V_{DS} = 22.5\text{ V}, V_{GEN} = 10\text{ V},$ $R_G = 4.5\ \Omega, R_L = 1.12\ \Omega,$ $I_D = 20\text{ A}$	-	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	-	
<b>Gate Charge Characteristics<sup>b</sup></b>						
$Q_g$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 22.5\text{ V},$ $I_{DS} = 20\text{ A}$	-	14	-	nC
$Q_{gs}$	Gate-Source Charge		-	3.1	-	
$Q_{gd}$	Gate-Drain Charge		-	2.9	-	

Notes :

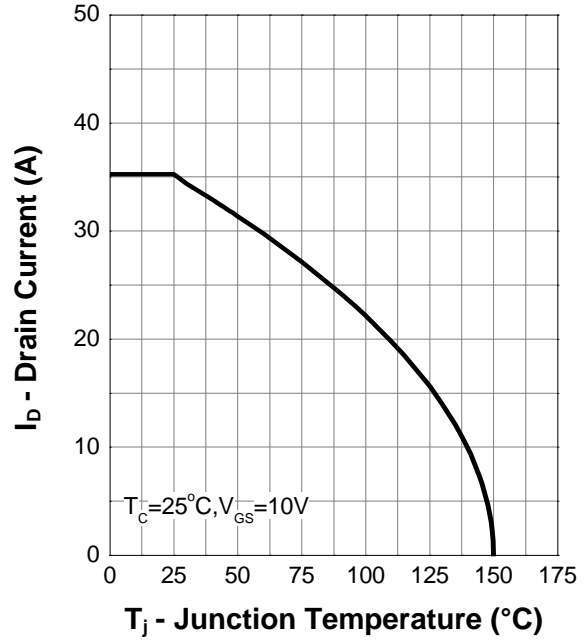
a : Pulse test ; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$

b : Guaranteed by design, not subject to production testing

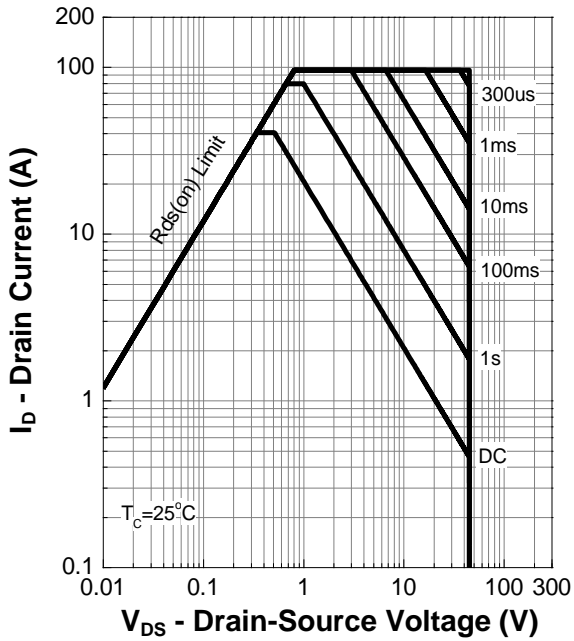
Typical Characteristics (cont.)  
Power Capability



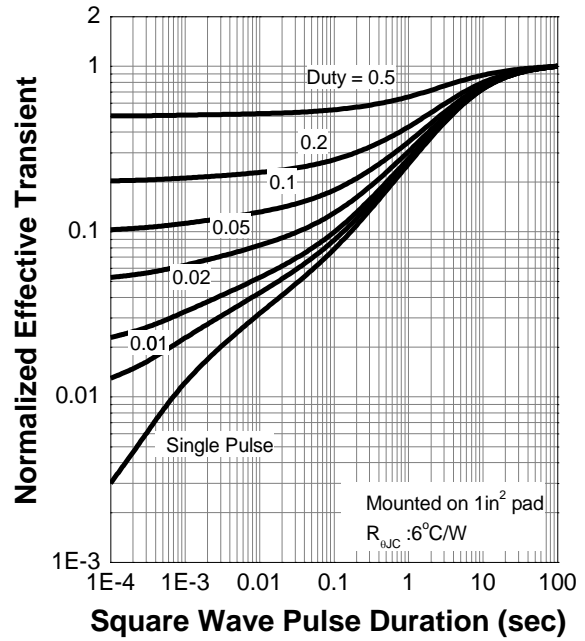
Current Capability



Safe Operating Area

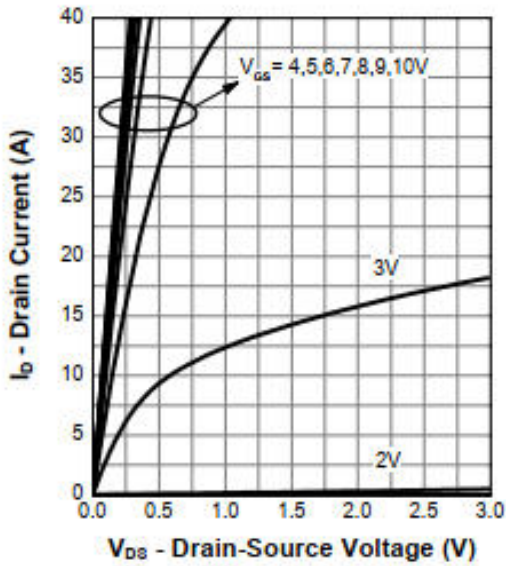


Transient Thermal Impedance

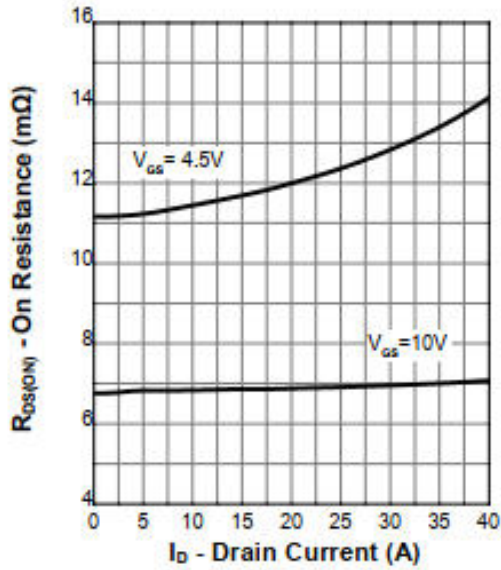


Typical Characteristics (cont.)

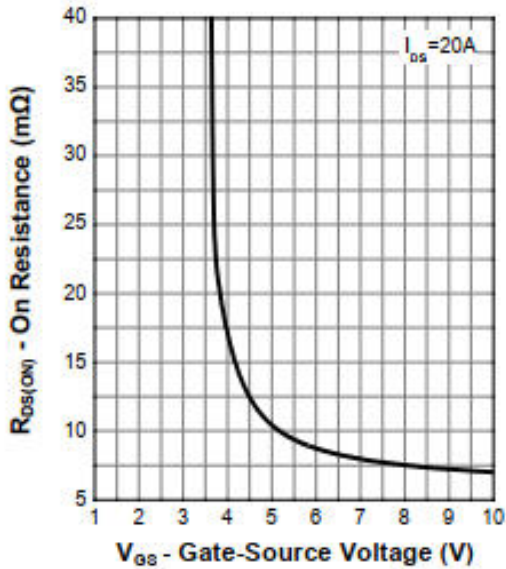
Output Characteristics



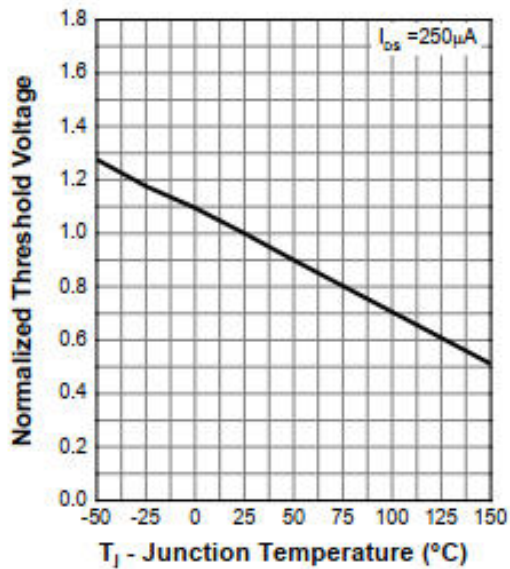
On Resistance



Transfer Characteristics

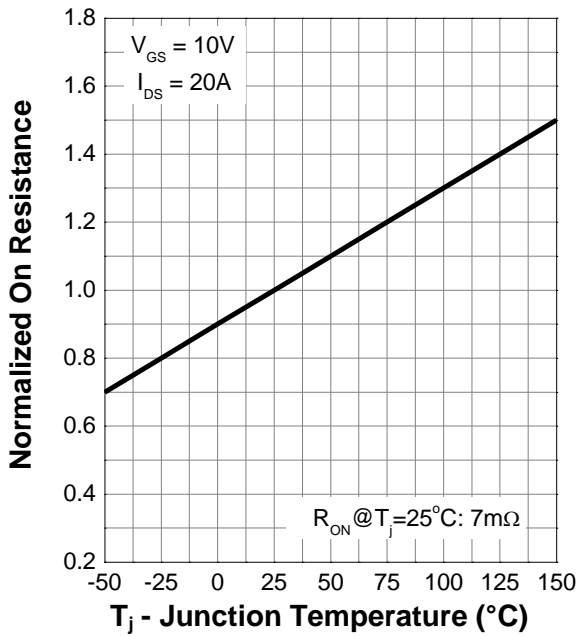


Normalized Threshold Voltage

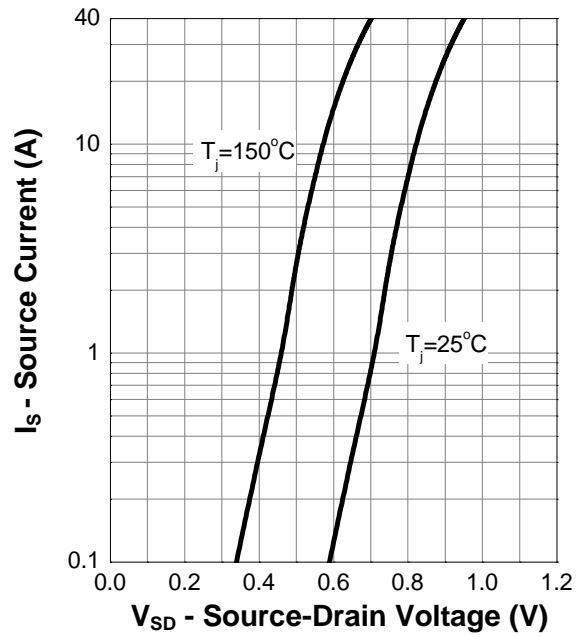


Typical Characteristics (cont.)

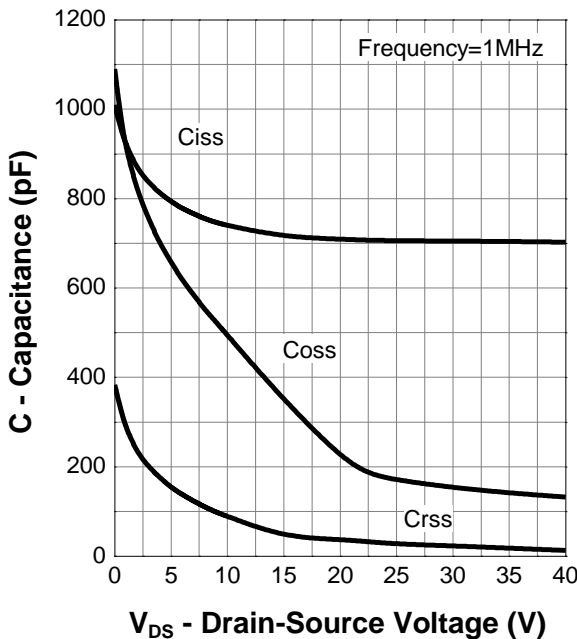
Normalized On Resistance



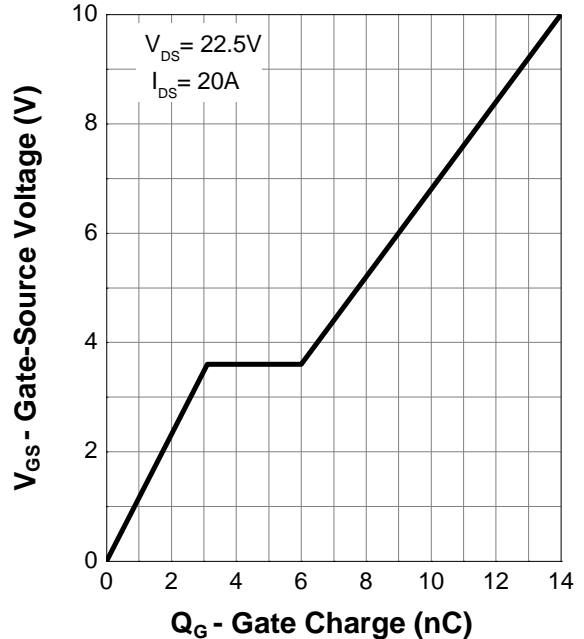
Diode Forward Current



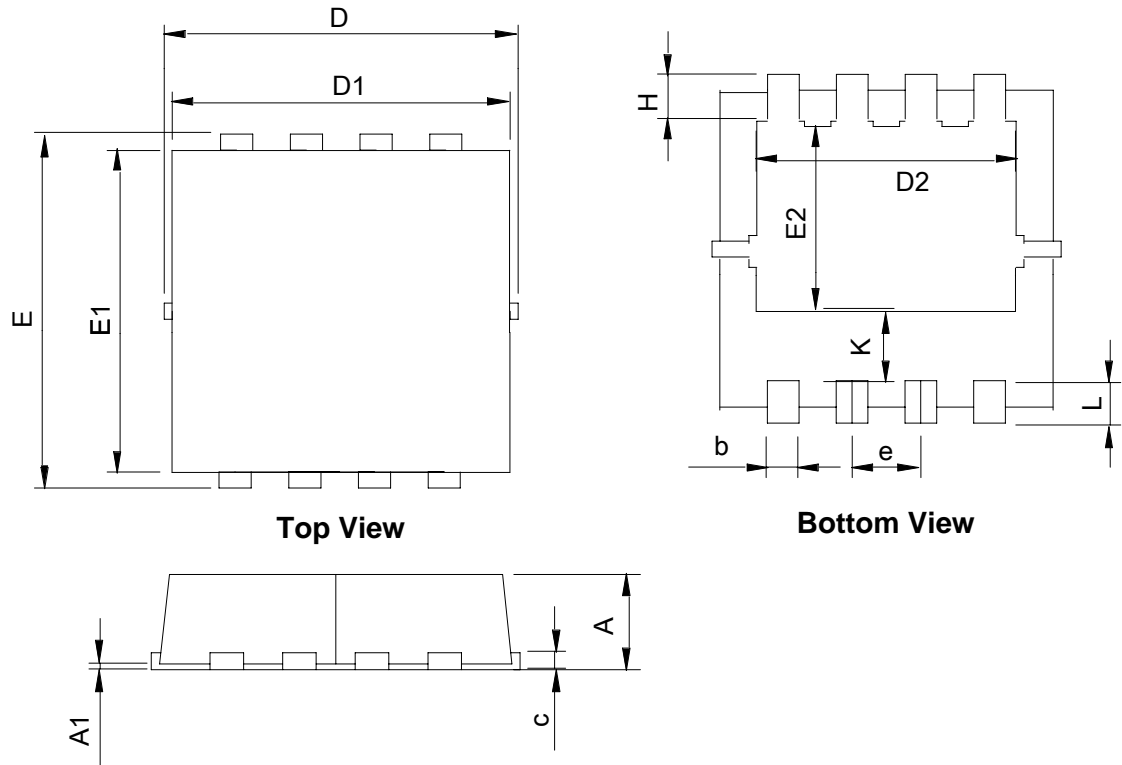
Capacitance



Gate Charge



## Package Information : PDFN3.3x3.3-8L



SYMBOL	PDFN3.3x3.3-8L			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022