

# FH1610G

## N-Channel Enhancement Mode Power MOSFET

### Description

The FH1610G 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.

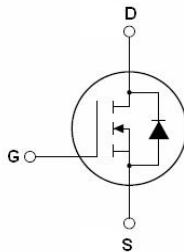
### Applications

- Power Management in Telecom., Industrial Automation, CE
- Current Switching in DC/DC & AC/DC Sub-systems
- Motor Driving in Power Tool, E-vehicle, Robotics

### Product Summary

Parameter	Typ.	Unit
$V_{DS}$	100	V
$V_{GS(th)}$	2.8	V
$I_D$ (@ $V_{GS} = 10V$ ) <sup>(1)</sup>	62	A
$R_{DS(ON)}$ (@ $V_{GS} = 10V$ )	7.8	m $\Omega$ ( MAX )

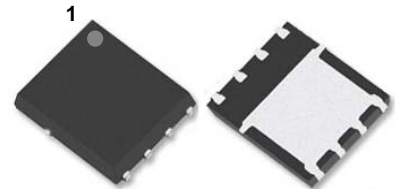
- Ultra-low  $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- 100% UIS Tested, 100%  $R_g$  Tested



Schematic dia Gram



Marking and pin Assignment



PDFN5x6-8L top and bottom view

### Absolute Maximum Ratings (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DS}$	100	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>(1)</sup>	$I_D$	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	
Pulsed Drain Current <sup>(2)</sup>	$I_{DM}$	248	A
Avalanche Current <sup>(3)</sup>	$I_{AS}$	41	A
Avalanche Energy <sup>(3)</sup>	$E_{AS}$	101	mJ
Power Dissipation <sup>(4)</sup>	$P_D$	$T_C = 25^\circ\text{C}$	W
		$T_C = 100^\circ\text{C}$	
Junction & Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

### Electrical Characteristics (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	100			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			1.0 5.0	$\mu\text{A}$
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.0	2.8	4.0	V
Static Drain-Source ON-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$		6.2	7.8	$\text{m}\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{V}, I_D = 20\text{A}$		51		S
Diode Forward Voltage	$V_{SD}$	$I_S = 1\text{A}, V_{GS} = 0\text{V}$		0.70	1.0	V
Diode Continuous Current	$I_S$	$T_C = 25^\circ\text{C}$			55	A
<b>DYNAMIC PARAMETERS <sup>(5)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 50\text{V}, f = 1\text{MHz}$		1920		pF
Output Capacitance	$C_{oss}$			445		pF
Reverse Transfer Capacitance	$C_{rss}$			7.0		pF
Gate Resistance	$R_g$	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$		1.5		$\Omega$
<b>SWITCHING PARAMETERS <sup>(5)</sup></b>						
Total Gate Charge (@ $V_{GS} = 10\text{V}$ )	$Q_g$	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 50\text{V}, I_D = 13\text{A}$		30		nC
Total Gate Charge (@ $V_{GS} = 6.0\text{V}$ )	$Q_g$			20		nC
Gate Source Charge	$Q_{gs}$			6.9		nC
Gate Drain Charge	$Q_{gd}$			8.4		nC
Turn-On Delay Time	$t_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 50\text{V}$ $R_L = 3.8\Omega, R_{GEN} = 6\Omega$		8.5		ns
Turn-On Rise Time	$t_r$			9.7		ns
Turn-Off Delay Time	$t_{D(off)}$			29		ns
Turn-Off Fall Time	$t_f$			19.1		ns
Body Diode Reverse Recovery Time	$t_{rr}$		$I_F = 13\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		52	
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F = 13\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$		55		nC

### Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	65	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.85	1.0	$^\circ\text{C}/\text{W}$

### Notes:

1. Computed continuous current assumes the condition of  $T_{J\_Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under  $T_{J\_Max} = 150^\circ\text{C}$ .
3. This single-pulse measurement was taken under the following condition [ $L = 100\mu\text{H}, V_{GS} = 10\text{V}, V_{DS} = 50\text{V}$ ] while its value is limited by  $T_{J\_Max} = 150^\circ\text{C}$ .
4. The power dissipation  $P_D$  is based on  $T_{J\_Max} = 150^\circ\text{C}$ .
5. This value is guaranteed by design hence it is not included in the production test.
6. Continuous current rating is limited by the package used.

## Typical Electrical & Thermal Characteristics

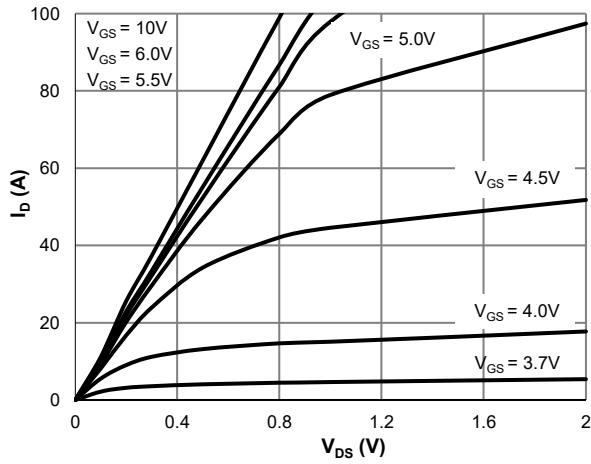


Figure 1: Saturation Characteristics

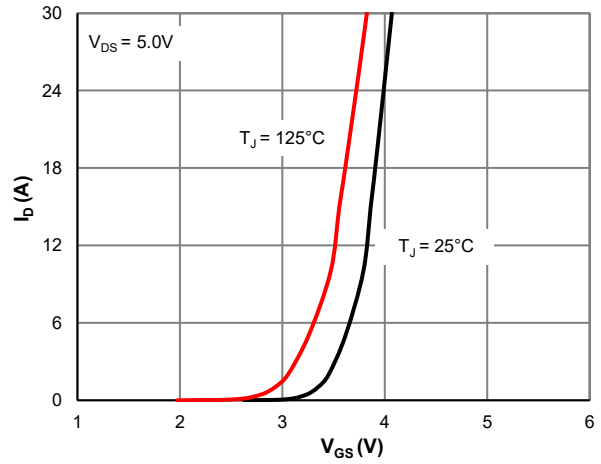


Figure 2: Transfer Characteristics

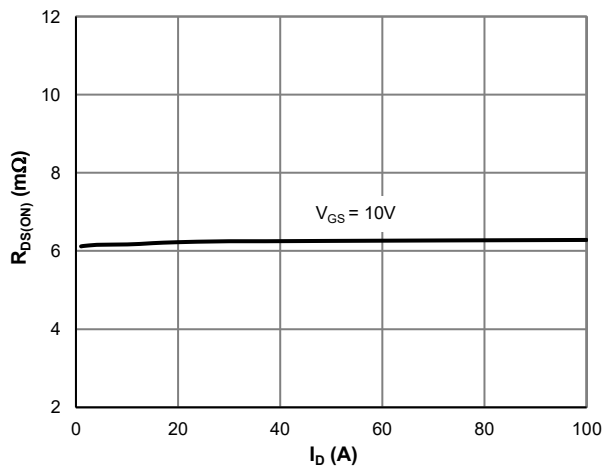


Figure 3:  $R_{DS(ON)}$  vs. Drain Current

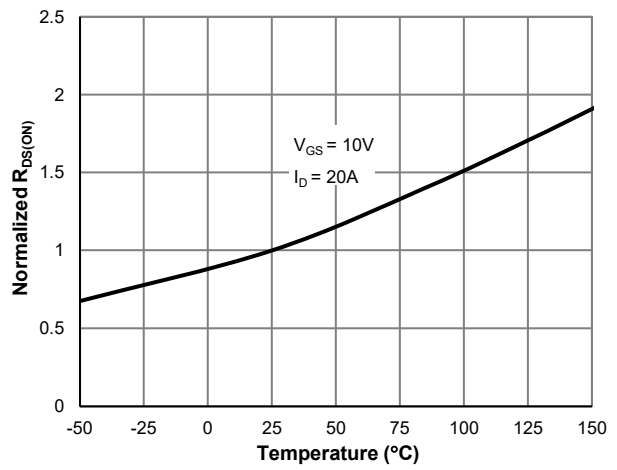


Figure 4:  $R_{DS(ON)}$  vs. Junction Temperature

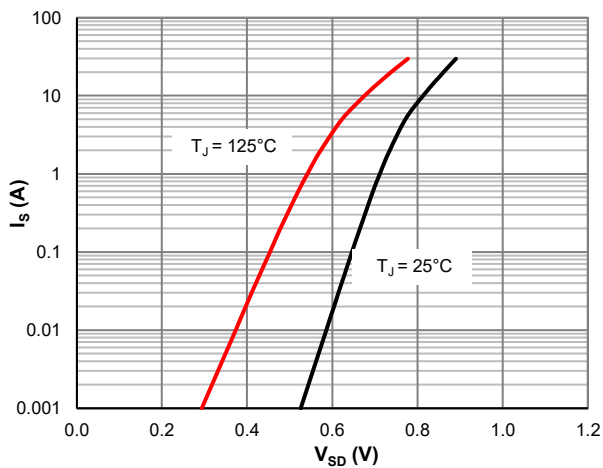


Figure 5: Body-Diode Characteristics

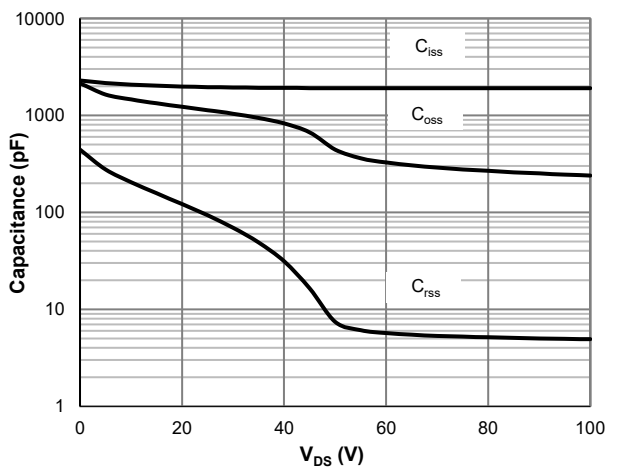


Figure 6: Capacitance Characteristics

## Typical Electrical & Thermal Characteristics

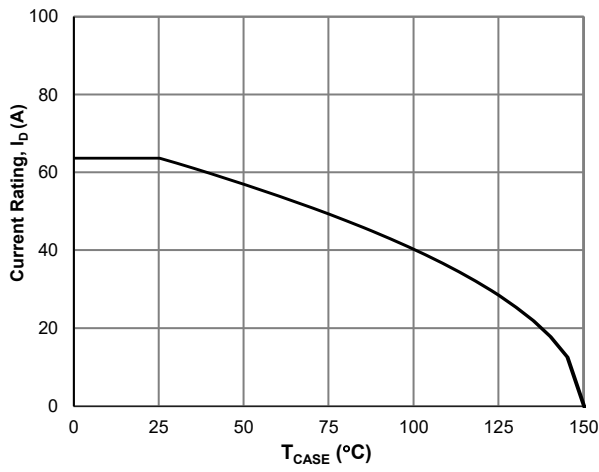


Figure 7: Current De-rating

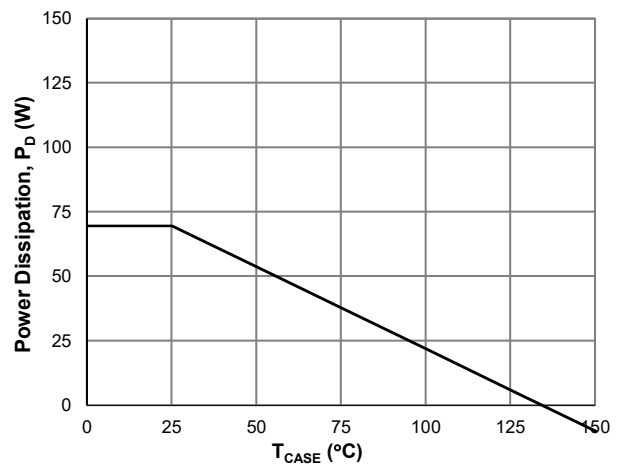


Figure 8: Power De-rating

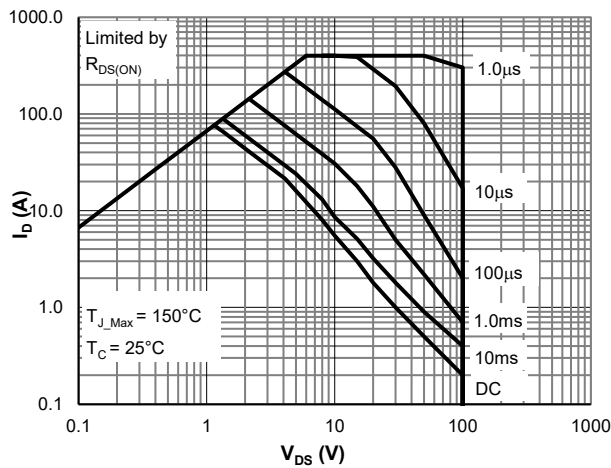


Figure 9: Maximum Safe Operating

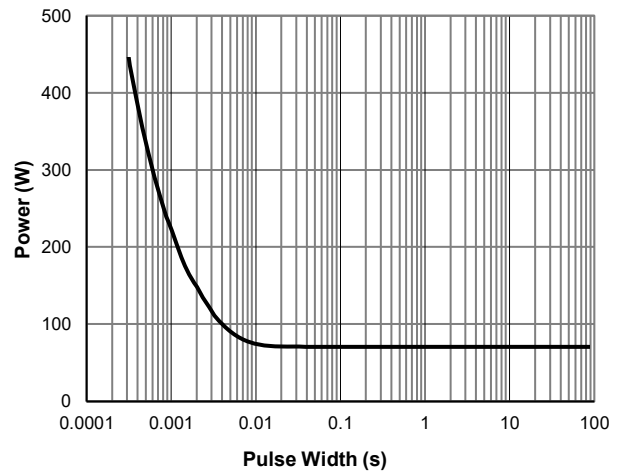
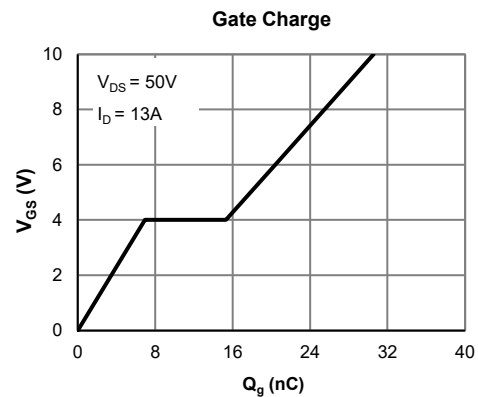
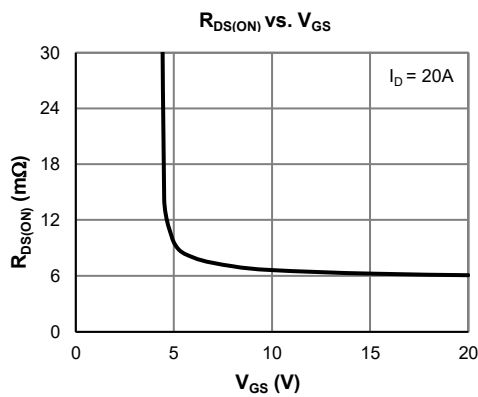


Figure 10: Single Pulse Power Rating, Junction-to-Case



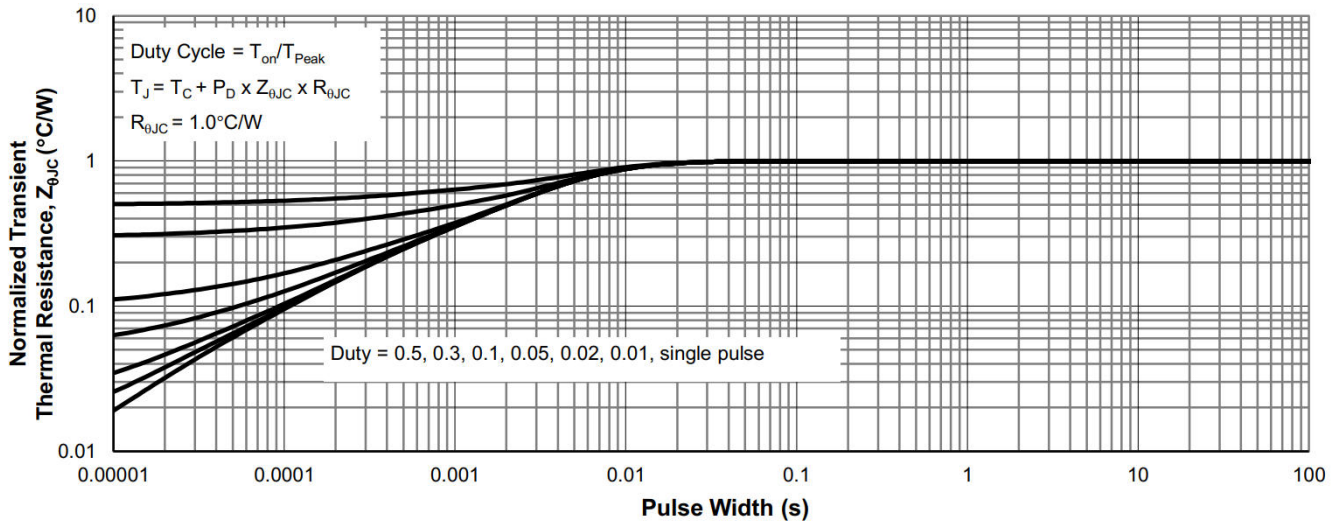
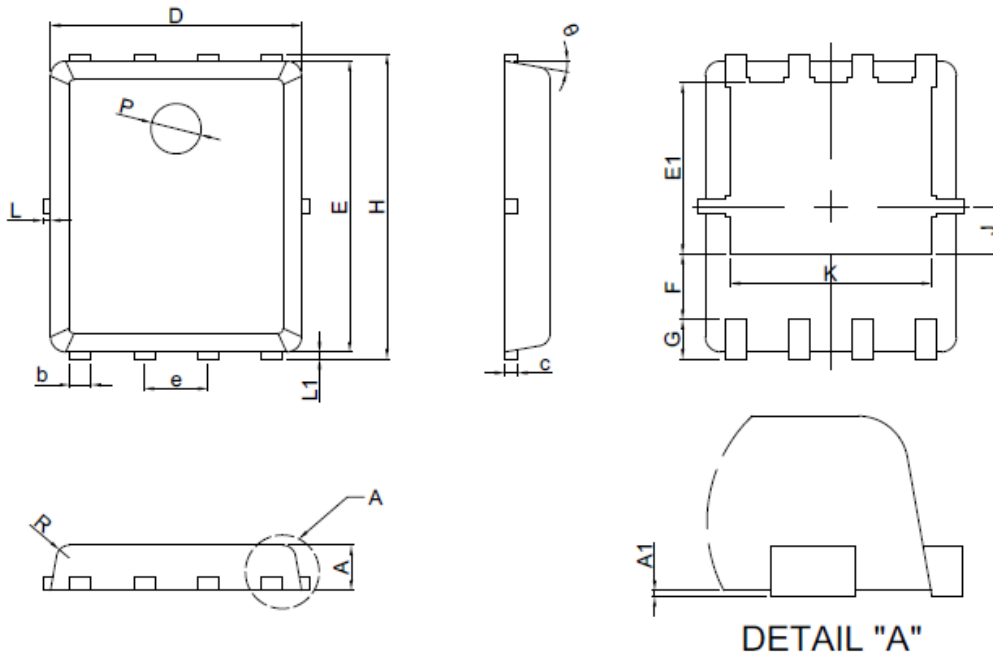


Figure 11: Normalized Maximum Transient Thermal Impedance

## Package Information : PDFN5x6-8L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	0.80	1.00
A1	0.00	0.05
b	0.35	0.49
c	0.254REF	
D	4.80	5.20
F	1.40REF	
E	5.60	5.90
e	1.27BSC	
H	5.80	6.20
L1	0.10	0.18
G	0.60REF	
K	4.00REF	
L	-	0.15
J	0.95BSC	
P	1.00REF	
E1	3.40REF	
θ	6°	14°
R	0.25REF	