FH3415W

P-Channel Enhancement Mode MOSFET

Description

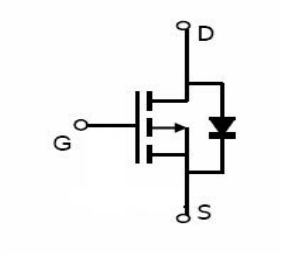
The FH3415W is the P-Channel enhancement mode MOSFET in a plastic package (SOT-23) using the Trench technology.

Applications

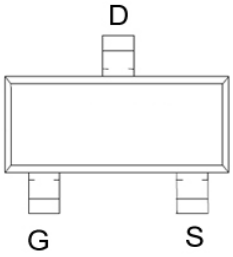
- Low Switch
- DC-DC Converters
- Lithium-Ion Battery Protection

Features

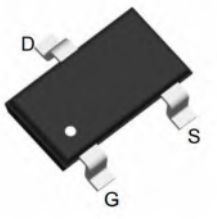
- V_{DS} = - 20V ; I_D = -4.1A
  $R_{DS(ON)}$(Typ.)= 32 mΩ @V_{GS} = -5.0V
  $R_{DS(ON)}$(Typ.)= 34 mΩ @V_{GS} = -4.5V
  $R_{DS(ON)}$(Typ.)= 43 mΩ @V_{GS} = -2.5V
- Trench Technology
- Fast Switching
- High Power and Current Handing Capability
- SMD Package (SOT-23)
- MSL-3 compliant



Schematic diagram



Marking and Pin Assignment



SOT-23 top view

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		±12	V
I_D	Continuous Drain Current	T_C = 25℃	-4.1	A
		T_C = 100℃	-3.3	
I_{DM}	Pulsed Drain Current note1		-15.2	A
P_D	Power Dissipation	T_C = 25℃	1.4	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		89.2	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D= -250μA	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -20V, V_{GS} = 0V,	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS} =0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D= -250μA	-0.45	-0.65	-1.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	V_{GS} =-5.0V, I_D =-1A	-	32	38	mΩ
		V_{GS} =-4.5V, I_D =-4A	-	34	42	
		V_{GS} =-2.5V, I_D =-3A	-	43	54	
g_{FS}	Forward Transconductance	V_{DS} =-5V, I_D = -2A	-	6	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz	-	611	-	pF
C_{oss}	Output Capacitance		-	96	-	pF
C_{rss}	Reverse Transfer Capacitance		-	84	-	pF
Q_g	Total Gate Charge	V_{DS} = -10V, I_D = -4A, V_{GS} = -4.5V	-	7.9	-	nC
Q_{gs}	Gate-Source Charge		-	1.2	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	1.6	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = -10V, I_D = -3.3A, R_G = 1Ω, V_{GEN}=-4.5V, R_L=1.2Ω	-	12	-	ns
t_r	Turn-on Rise Time		-	35	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	30	-	ns
t_f	Turn-off Fall Time		-	10	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4.1	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-15.2	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = -4A	-	-	-1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} =0V, I_S=-4A, di/dt=100A/μs	-	20	-	ns
Q_{rr}	Reverse Recovery Charge		-	9	-	nC

Notes:1. Repetitive Rating: Pulse Width

2. Pulse Test: Pulse Width Limited by Maximum Junction Temperature ≤300μs, Duty Cycle≤2%

Typical Performance Characteristics

Figure1: Output Characteristics

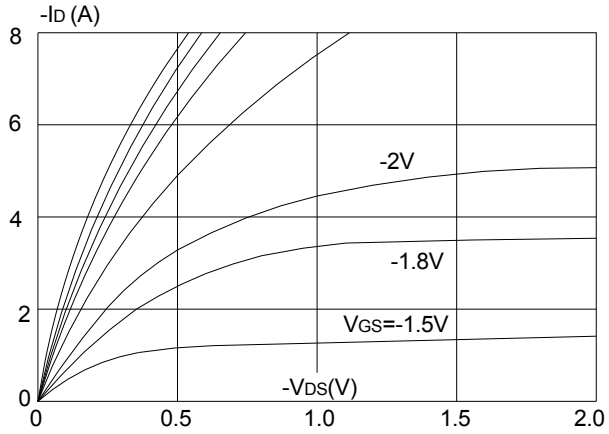


Figure 2: Typical Transfer Characteristics

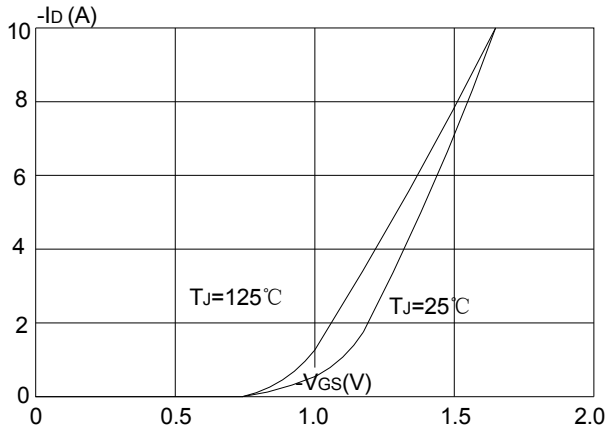


Figure 3: On-resistance vs. Drain Current

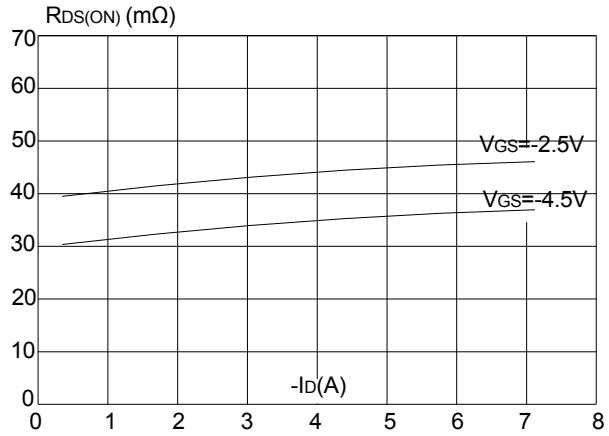


Figure 4: Body Diode Characteristics

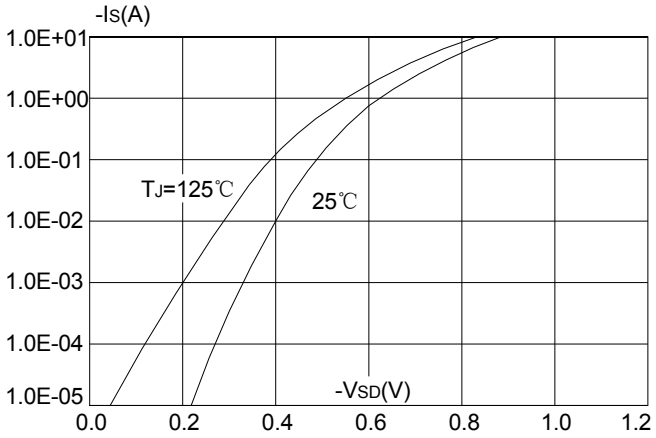


Figure 5: Gate Charge Characteristics

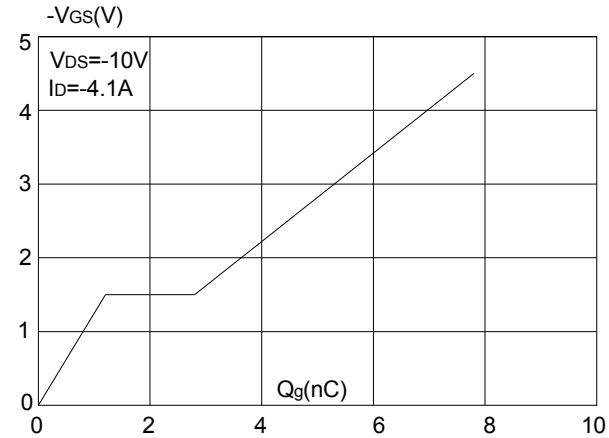


Figure 6: Capacitance Characteristics

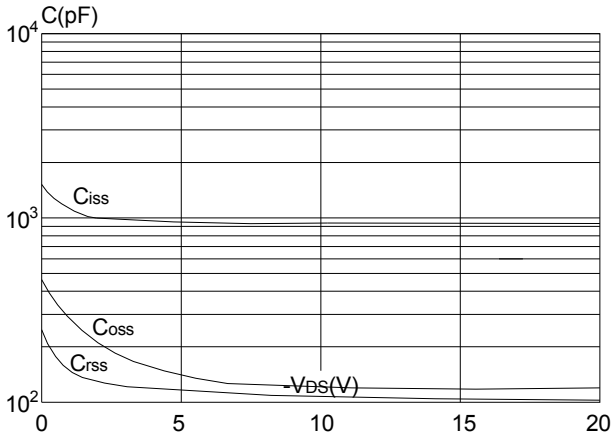


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

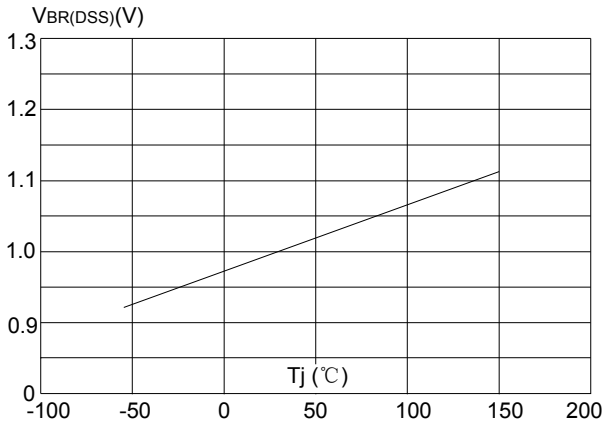


Figure 8: Normalized on Resistance vs. Junction Temperature

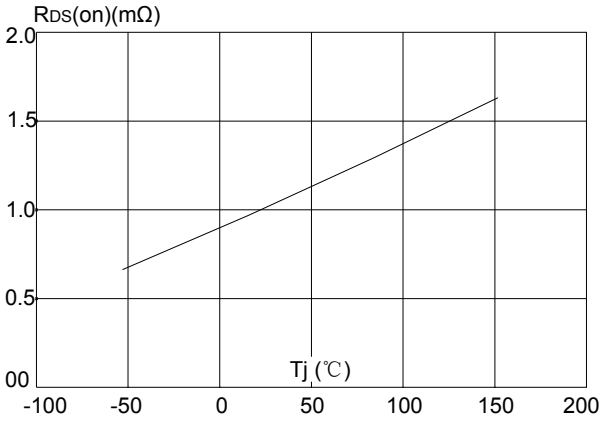


Figure 9: Maximum Safe Operating Area

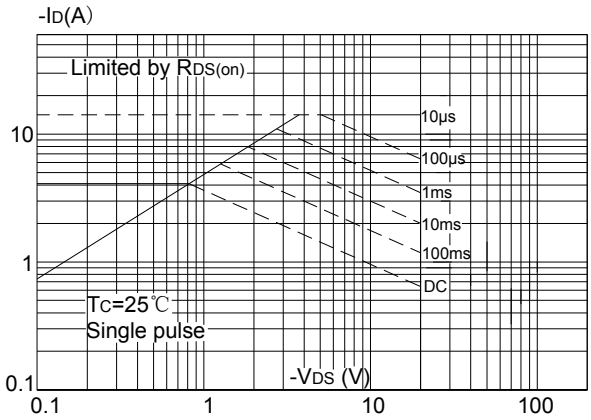


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

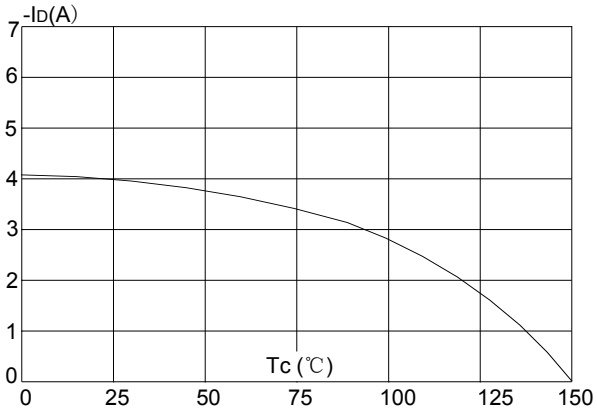
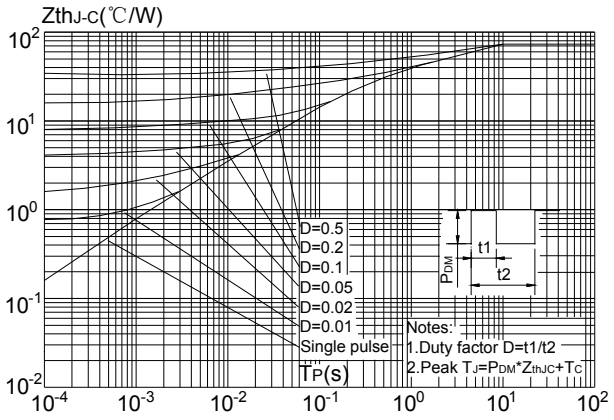


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient (SOT-23)



Typical Electrical and Thermal Characteristics

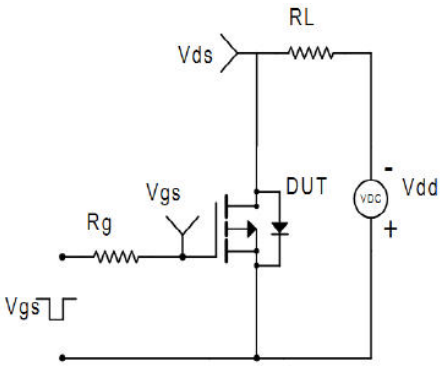


Figure1:Switching Test Circuit

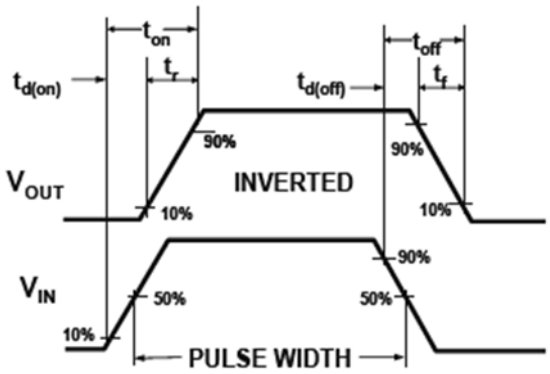


Figure2:Switching Waveforms

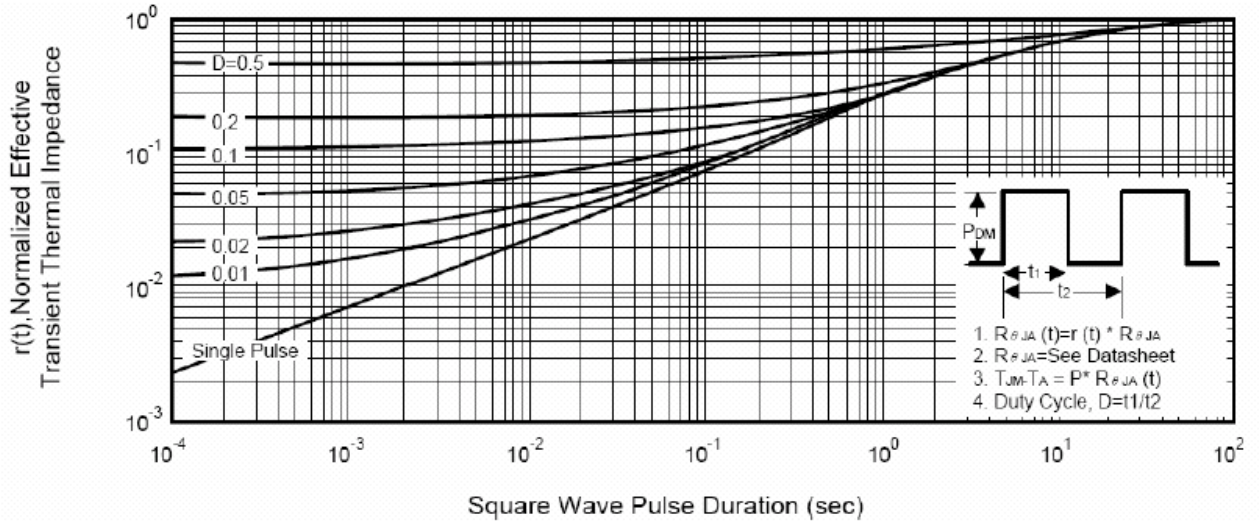
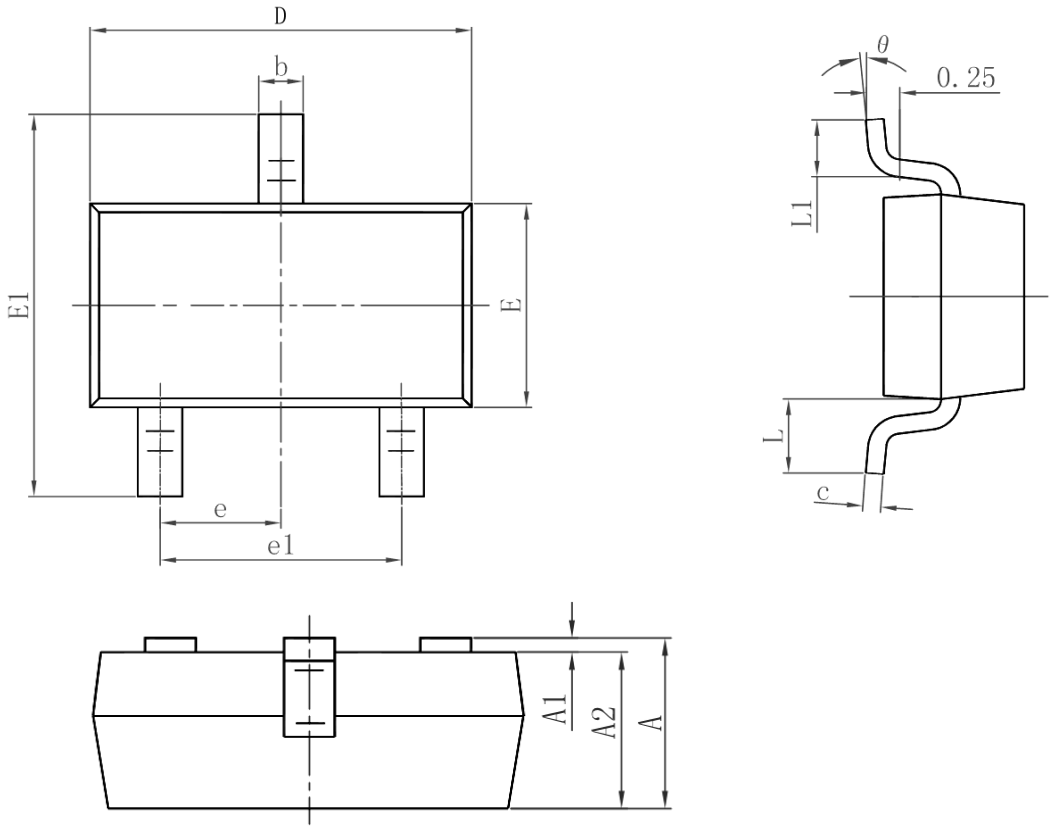


Figure 3: Normalized Maximum Transient Thermal Impedance

Package Dimensions : SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°