

FH3415K+

P-Channel Enhancement Mode Power MOSFET

Description

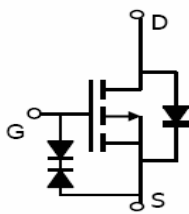
The FH3415K+ uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

Application

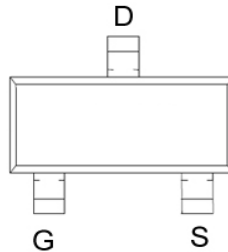
- PWM application
- Load switch

General Features

- $V_{DS} = -20V, I_D = -4.3A$
- $R_{DS(ON)}(Typ.) = 30m\Omega @ V_{GS} = -5.0V$
- $R_{DS(ON)}(Typ.) = 32m\Omega @ V_{GS} = -4.5V$
- $R_{DS(ON)}(Typ.) = 38m\Omega @ V_{GS} = -2.5V$
- ESD Rating: 2000V HBM
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package



Schematic diagram



Marking and Pin Assignment



SOT-23 top view

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 10	V
Drain Current-Continuous	I_D	-4.3	A
Drain Current-Pulsed (Note 1)	I_{DM}	-17.2	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	88.6	°C/W
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Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-20	-23	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±10V, V _{DS} =0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.45	-0.65	-1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-5.0V, I _D =-1A	-	30	38	mΩ
		V _{GS} =-4.5V, I _D =-4A	-	32	39	mΩ
		V _{GS} =-2.5V, I _D =-2A	-	38	48	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-4A	-	21	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-10V, V _{GS} =0V, F=1.0MHz	-	1458	-	PF
Output Capacitance	C _{oss}		-	194	-	PF
Reverse Transfer Capacitance	C _{rss}		-	153	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, R _L =2. 5Ω V _{GS} =-4.5V, R _{GEN} =3Ω	-	9.6		nS
Turn-on Rise Time	t _r		-	17		nS
Turn-Off Delay Time	t _{d(off)}		-	89		nS
Turn-Off Fall Time	t _f	V _{DS} =-10V, I _D =-4A, V _{GS} =-4.5V	-	35		nS
Total Gate Charge	Q _g		-	17.2		nC
Gate-Source Charge	Q _{gs}		-	1.3	-	nC
Gate-Drain Charge	Q _{gd}		-	4.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-1A	-	-0.79	-1	V
Diode Forward Current (Note 2)	I _S		-	-	-2.2	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

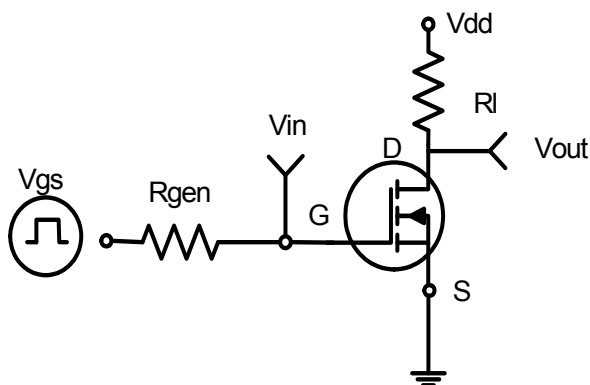


Figure 1: Switching Test Circuit

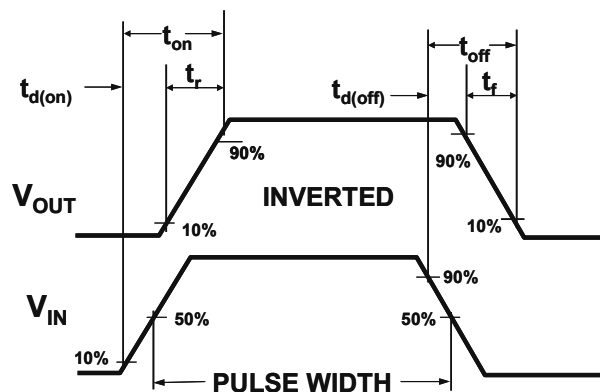


Figure 2: Switching Waveforms

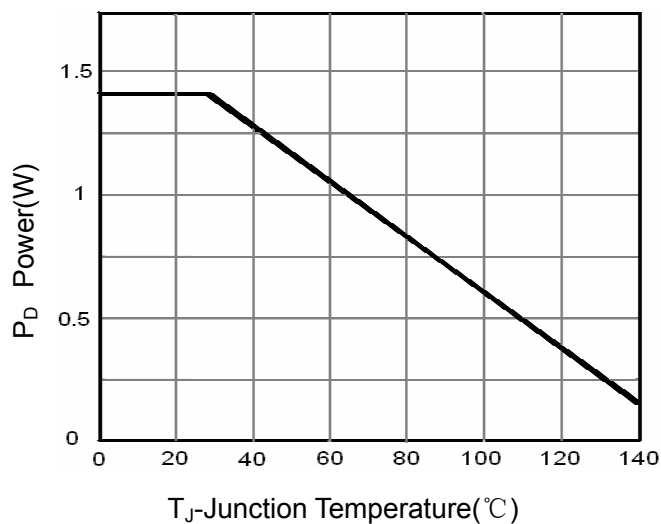


Figure 3 Power Dissipation

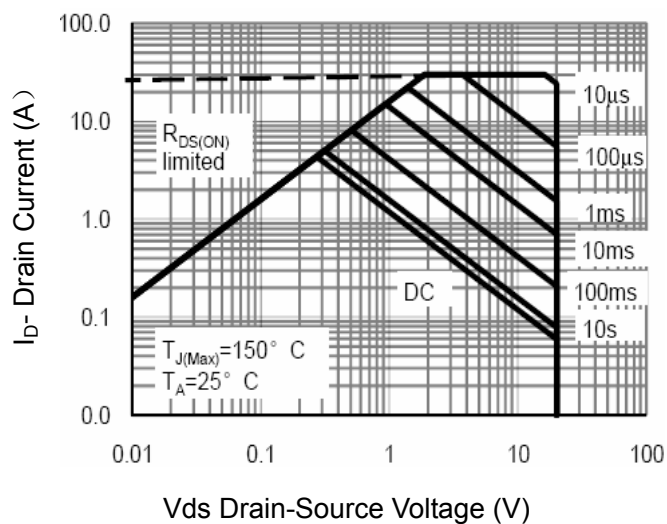


Figure 4 Safe Operation Area

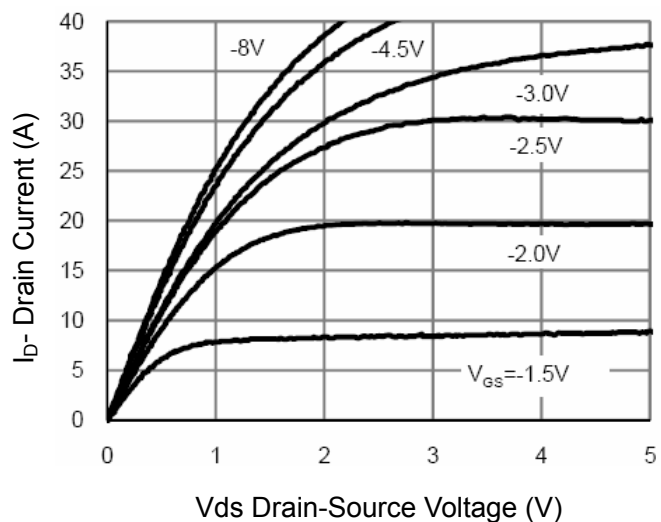


Figure 5 Output CHARACTERISTICS

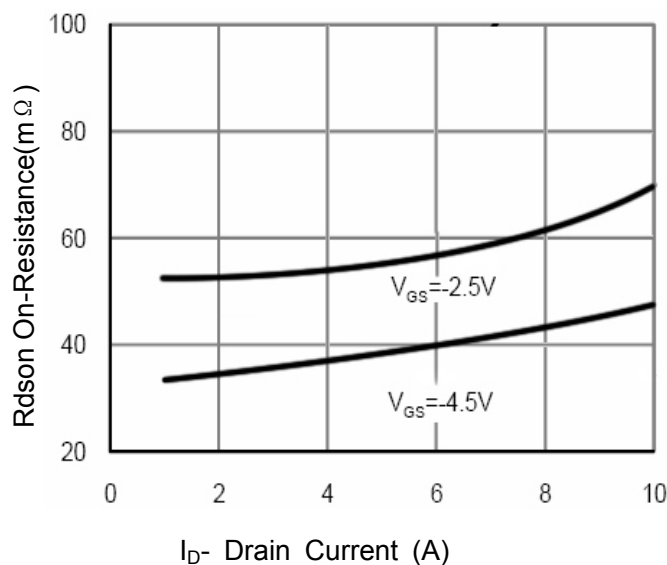


Figure 6 Drain-Source On-Resistance

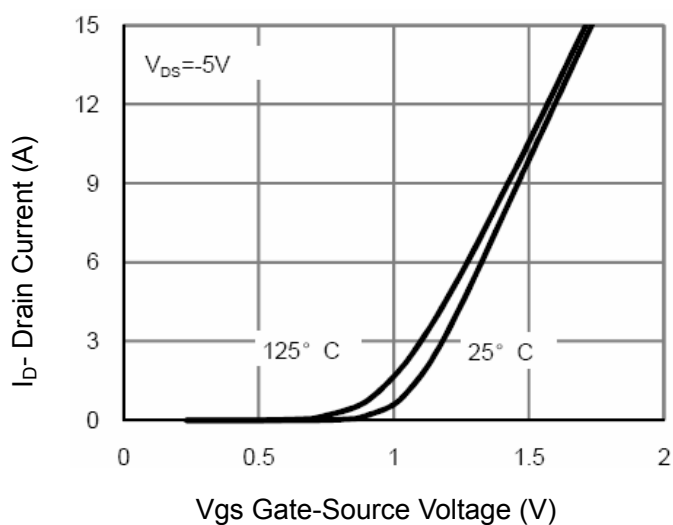


Figure 7 Transfer Characteristics

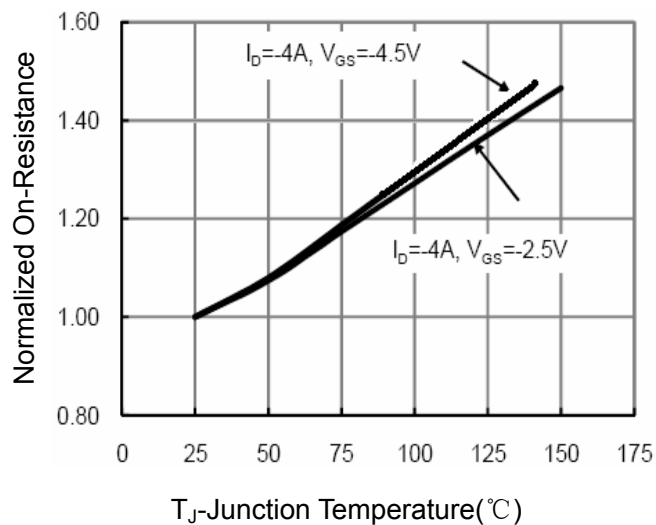


Figure 8 Drain-Source On-Resistance

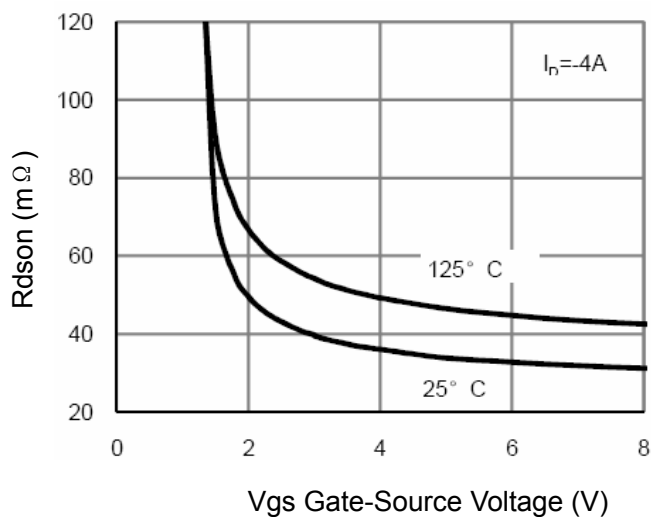


Figure 9 Rdson vs Vgs

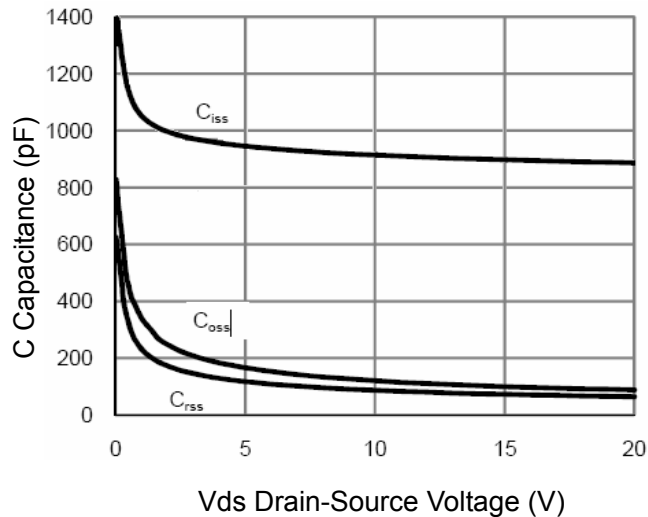


Figure 10 Capacitance vs Vds

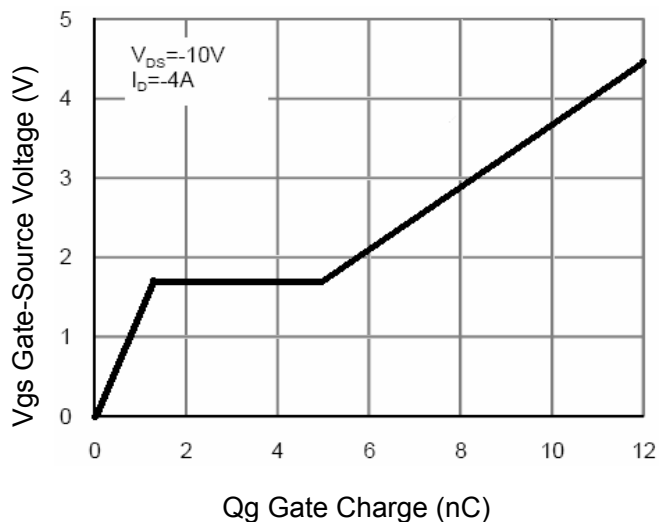


Figure 11 Gate Charge

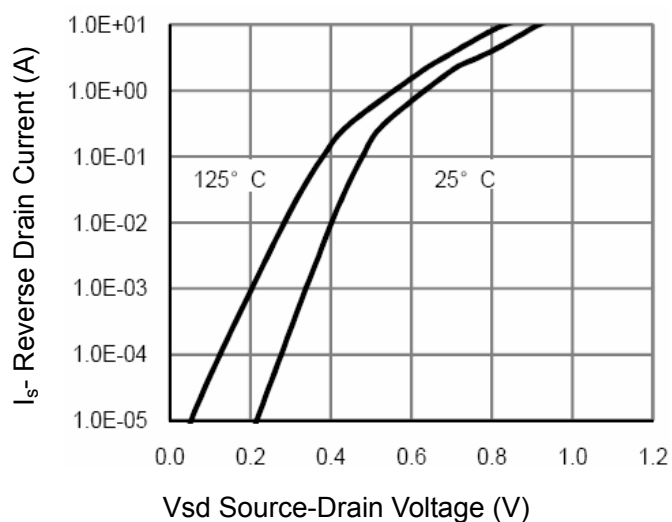


Figure 12 Source- Drain Diode Forward

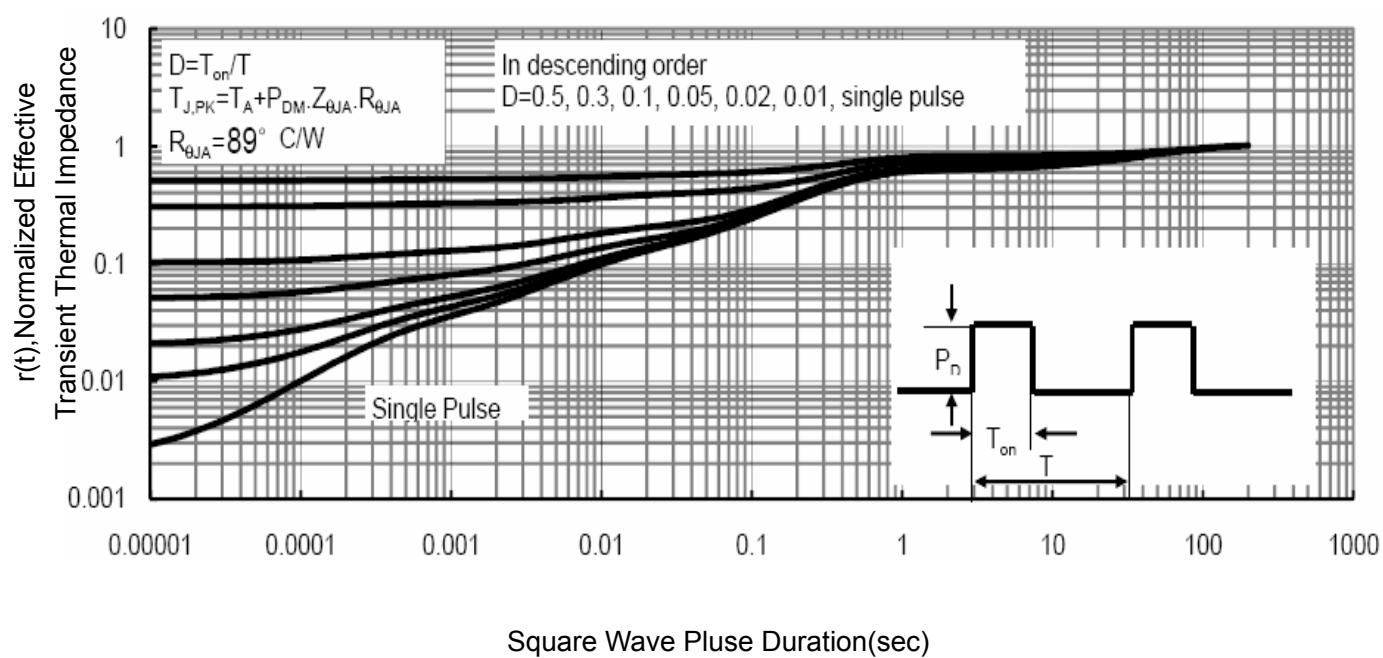
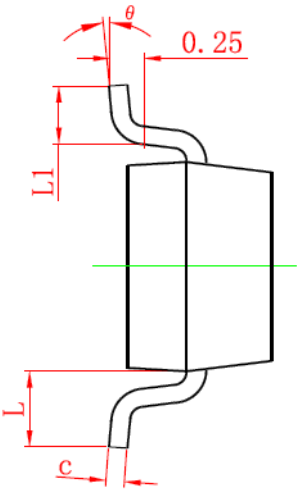
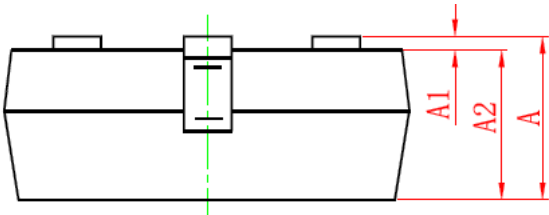
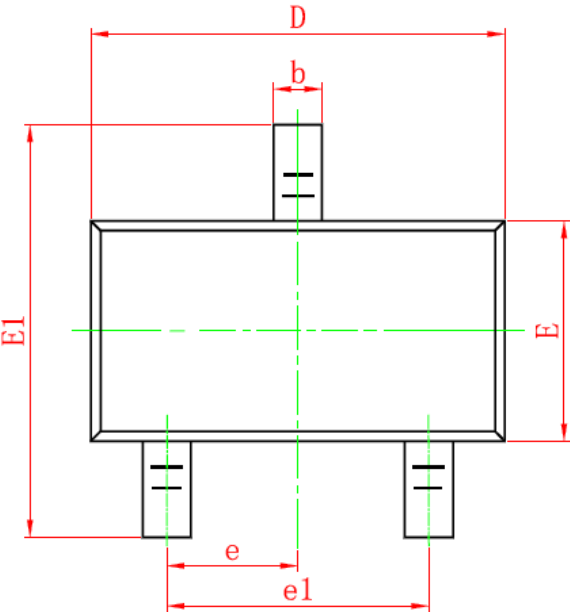


Figure 13 Normalized Maximum Transient Thermal Impedance

PACKAGE INFORMATION : SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500