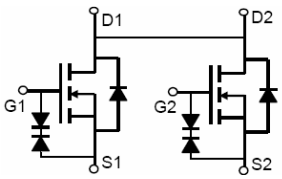
N-Channel Enhancement Mode Power MOSFET

Description

The FNK0203EA uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 0.7V. This device is suitable for use as a load switch or in PWM applications .It is ESD protested.



Schematic diagram

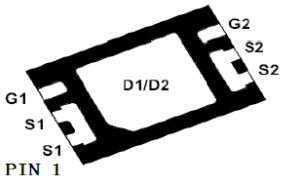
General Features

- V_{DS} = 20V,I_D =10A
  $R_{DS(ON)}$ < 19mΩ @ V_{GS}=2.5V
  $R_{DS(ON)}$ < 13mΩ @ V_{GS}=4.5V
  ESD Rating: 2500V HBM
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- Uni-directional load switch
- Bi-directional load switch

Marking and pin assignment



DFN2*3-6 top view

Absolute Maximum Ratings (T_A=25℃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	10	A
Drain Current-Pulsed (Note 1)	I_{DM}	40	A
Maximum Power Dissipation	P_D	2	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	62.5	℃/W

Electrical Characteristics (T_A=25℃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			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	μA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
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	0.7	1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=5A	-	11	15	mΩ
		V_{GS}=2.5V, I_D=4A	-	15	19	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=5A	-	15	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=10V,V_{GS}=0V, F=1.0MHz	-	1295	-	PF
Output Capacitance	C_{oss}		-	220	-	PF
Reverse Transfer Capacitance	C_{rss}		-	200	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V,R_L=1.2Ω V_{GS}=10V,R_{GEN}=3Ω	-	2.5		nS
Turn-on Rise Time	t_r		-	7.2		nS
Turn-Off Delay Time	$t_{d(off)}$		-	49		nS
Turn-Off Fall Time	t_f		-	10.8		nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=8A, V_{GS}=4.5V	-	17.9		nC
Gate-Source Charge	Q_{gs}		-	1.5	-	nC
Gate-Drain Charge	Q_{gd}		-	4.7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=2.3A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	8	A

Notes:

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

Typical Electrical and Thermal Characteristics

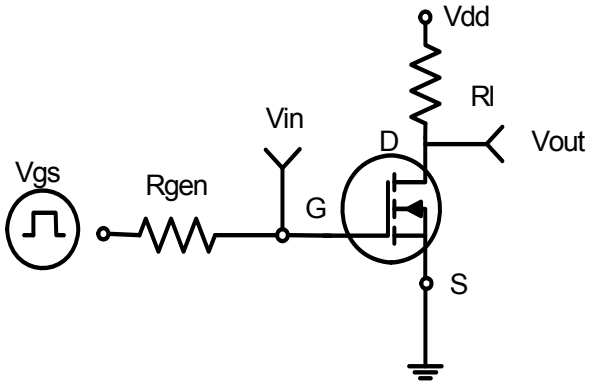


Figure 1:Switching Test Circuit

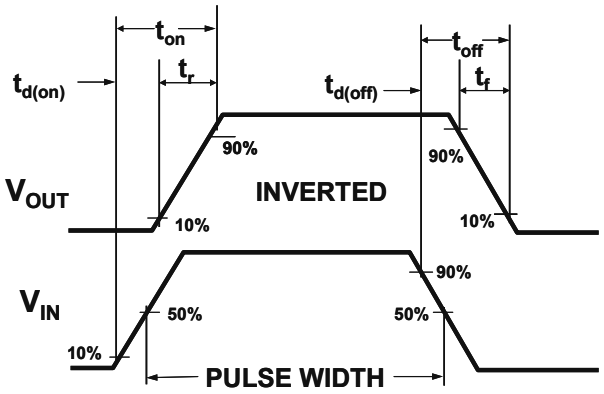


Figure 2:Switching Waveforms

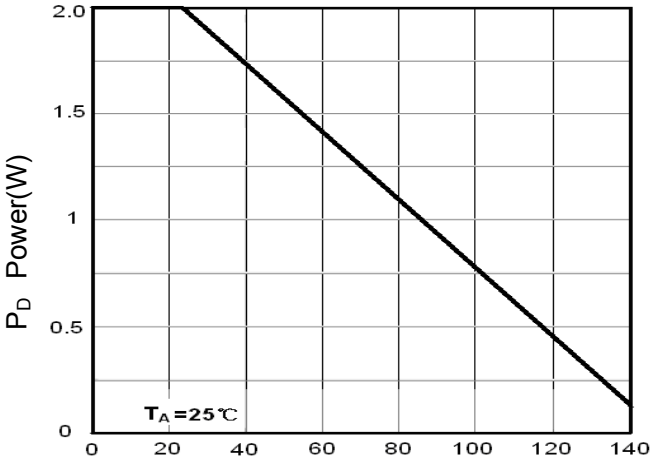


Figure 3 Power Dissipation

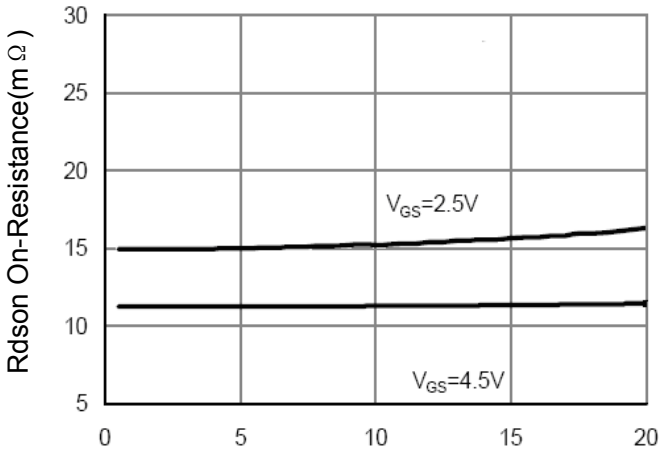


Figure 6 Drain-Source On-Resistance

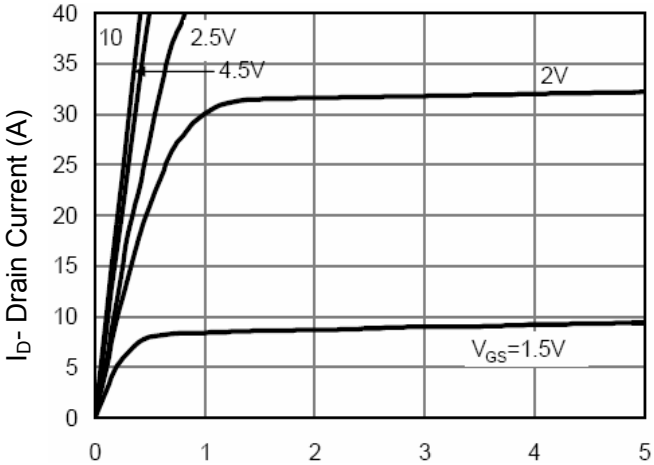


Figure 5 Output Characteristics

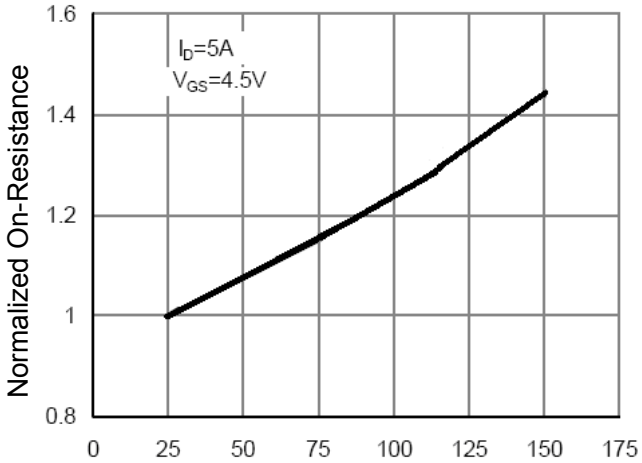


Figure 8 Drain-Source On-Resistance

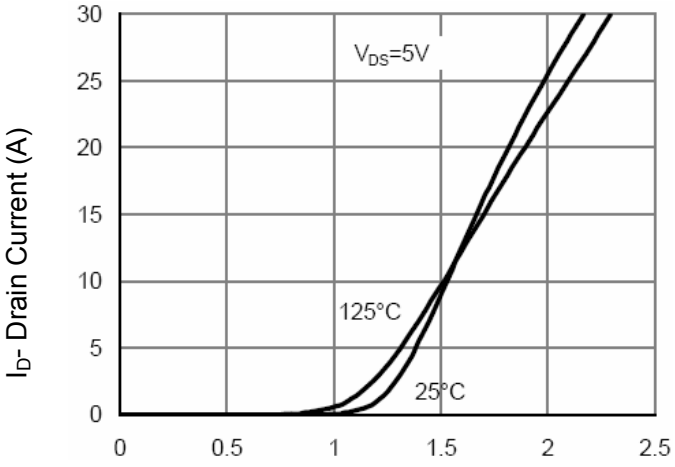


Figure 7 Transfer Characteristics

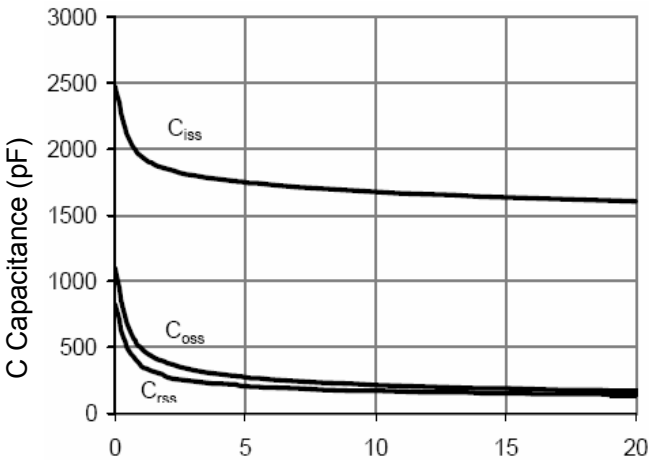


Figure 8 Capacitance vs Vds

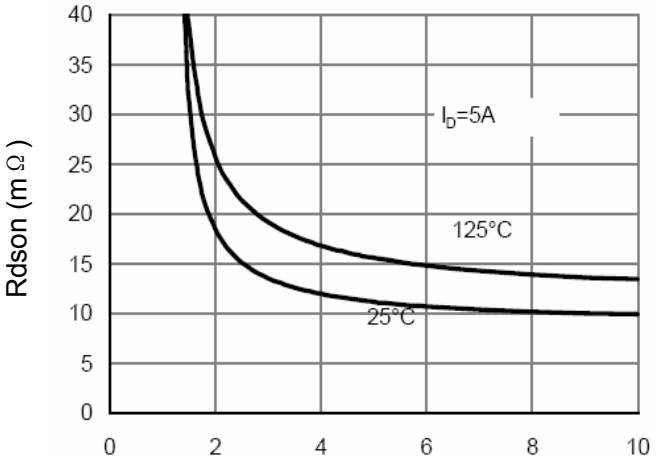


Figure 9 Rdson vs Vgs

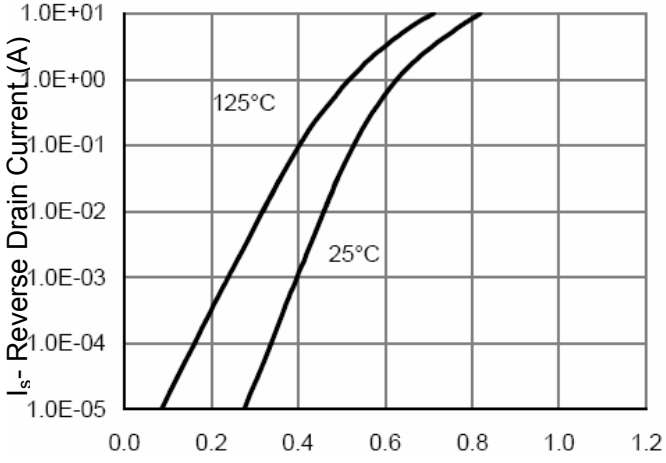


Figure 10Source-DrainDiodeForward

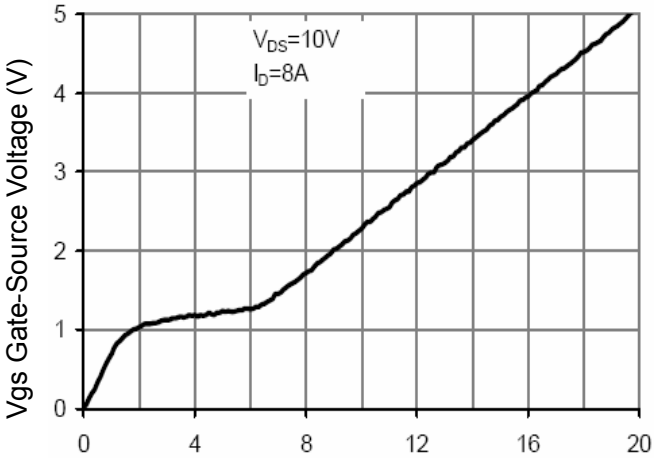


Figure 11 Gate Charge

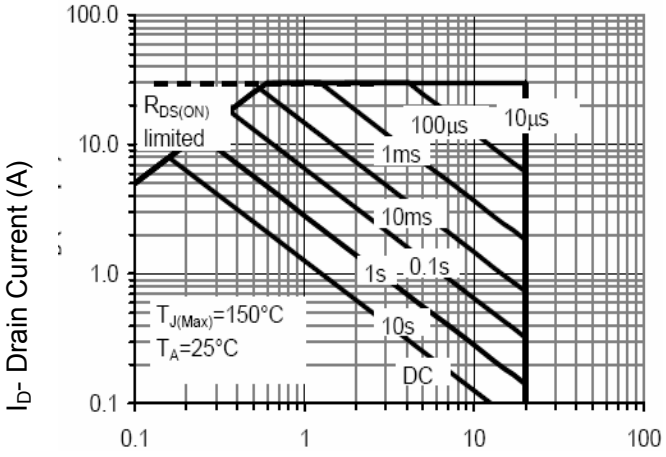


Figure 13 Safe Operation Area

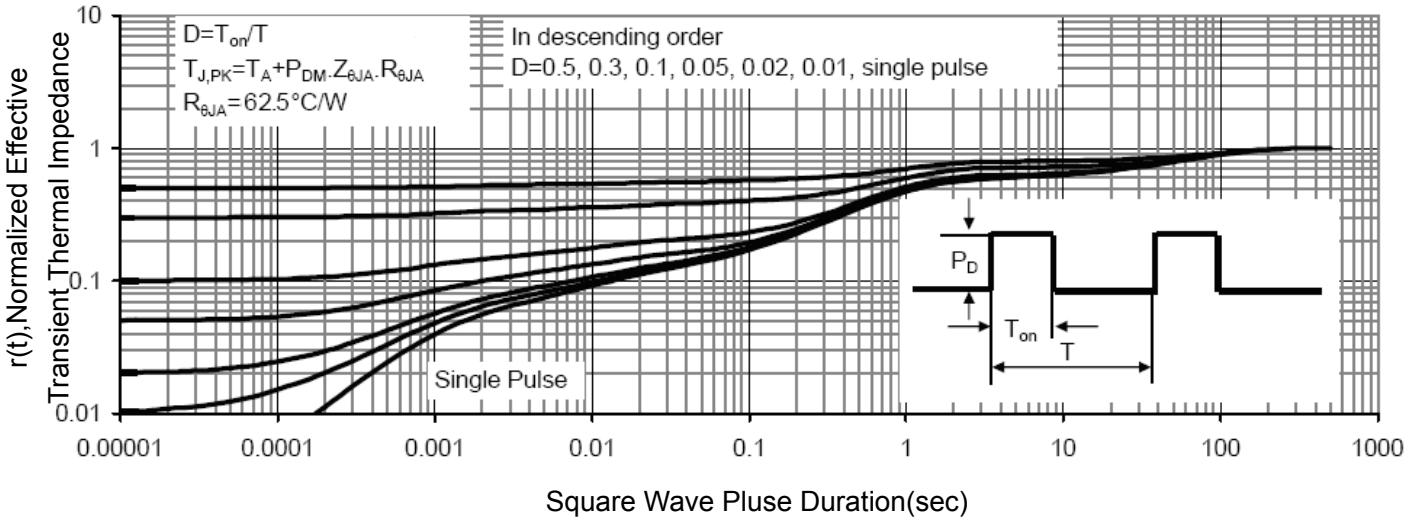
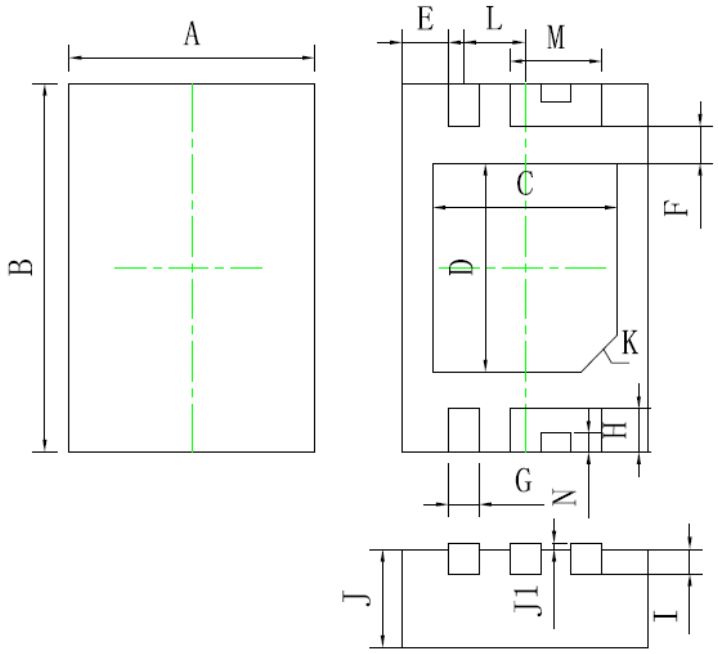


Figure 14 Normalized Maximum Transient Thermal Impedance

封装外形尺寸图



符号	单位：mm		
	MIN	NOM	MAX
A	1.95	2.00	2.05
B	2.95	3.00	3.05
C	1.45	1.50	1.55
D	1.65	1.70	1.75
E	0.33	0.38	0.43
F	0.25	0.30	0.35
G	0.20	0.25	0.30
H	0.35	0.40	0.45
I	0.2 BSC		
J	0.75	0.80	0.85
J1	0-0.05		
K	0.3×45° BSC		
L	0.5 BSC		
M	0.70	0.75	0.80
N	0.10	0.15	0.20

ATTENTION:

■ FNK reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
■ FNK assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all FNK products described or contained herein.
■ Specifications of any and all FNK products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
■ FNKstrives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
■ In the event that any or all FNK products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the FNK product that you intend to use.
■ FNK will supply the best possible product for customers!