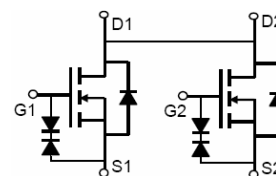


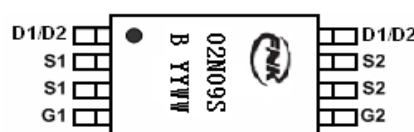
FNK N-Channel Enhancement Mode Power MOSFET

Description

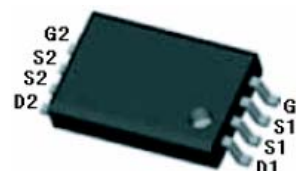
The FNK02N09S uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.



Schematic diagram



Marking and pin assignment



TSSOP-8 top view

General Features

- $V_{DS} = 20V, I_D = 15A$
 $R_{DS(ON)} < 15m\Omega @ V_{GS}=2.5V$
 $R_{DS(ON)} < 10m\Omega @ V_{GS}=4.5V$
ESD Rating: 2000V HBM
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

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

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
02N09S	FNK02N09S	TSSOP-8	Ø330mm	12mm	3000 units

Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	15	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	60	A
Maximum Power Dissipation	P_D	2	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	62.5	$^\circ C/W$
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Electrical Characteristics ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	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	-	8.1	10	mΩ
		V _{GS} =2.5V, I _D =4A	-	10.2	15	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =5A	-	15	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =10V,V _{GS} =0V, F=1.0MHz	-	1800	-	PF
Output Capacitance	C _{oss}		-	230	-	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 =8A	-	-	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, $t \leq 10$ 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

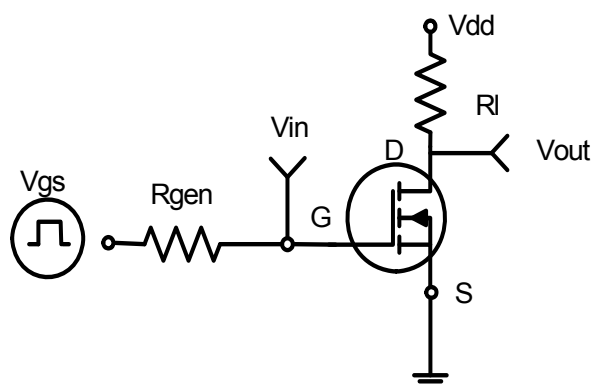


Figure 1: Switching Test Circuit

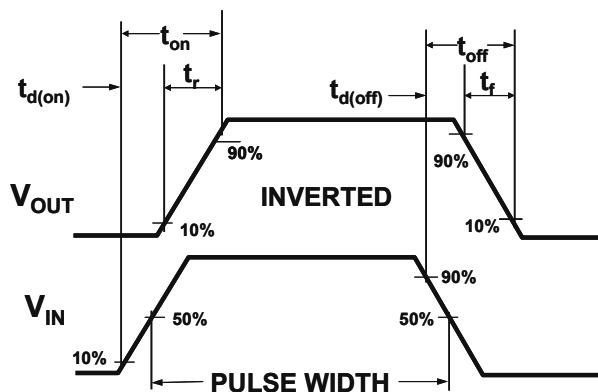


Figure 2: Switching Waveforms

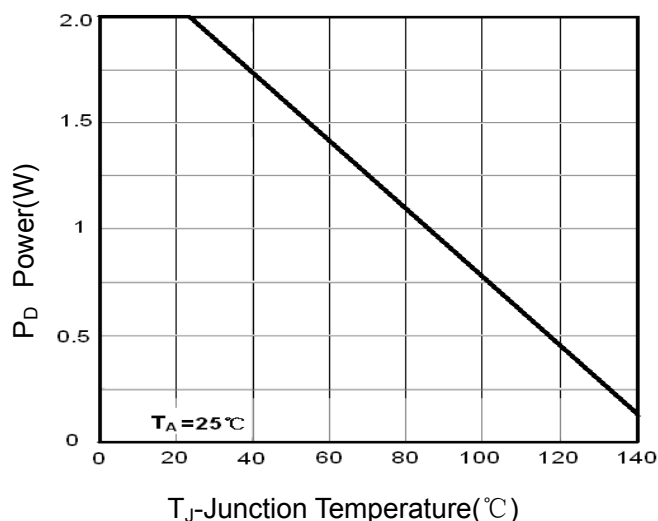


Figure 3: Power Dissipation

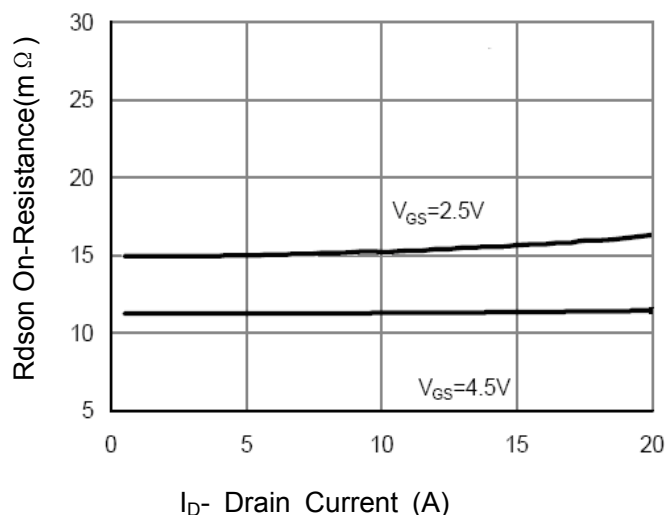


Figure 6: Drain-Source On-Resistance

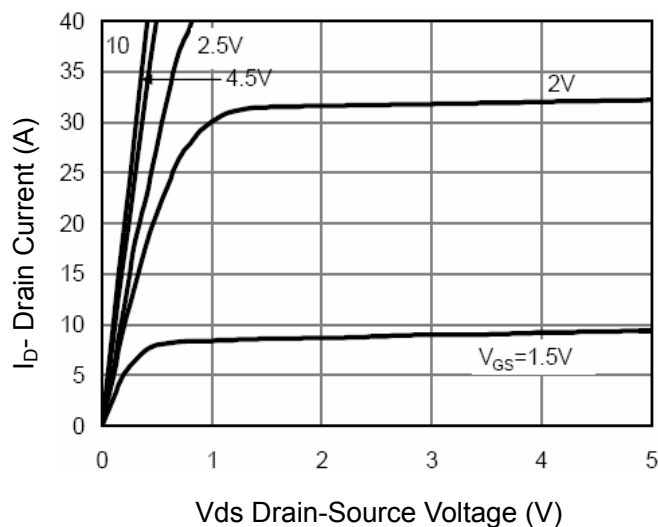


Figure 5: Output Characteristics

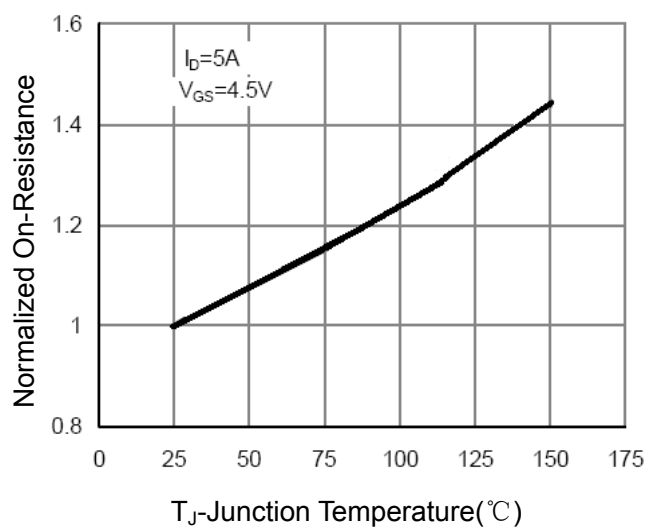


Figure 8: Drain-Source On-Resistance

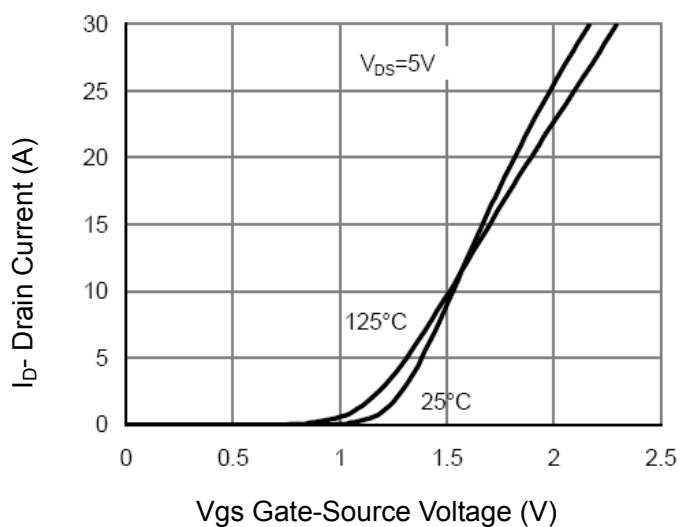


Figure 7 Transfer Characteristics

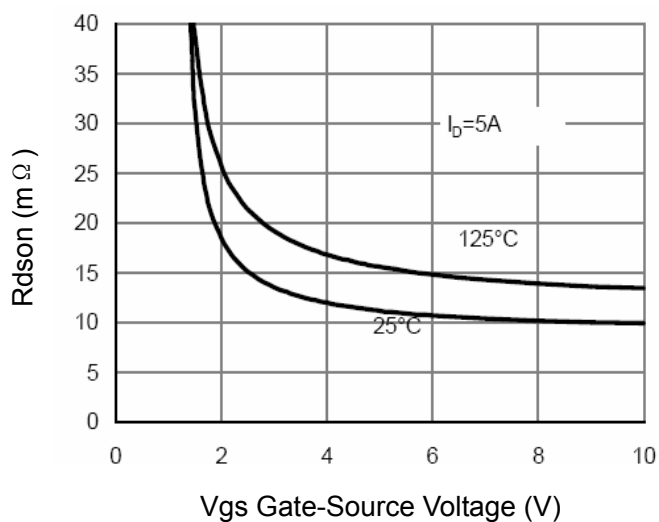


Figure 9 Rdson vs VGS

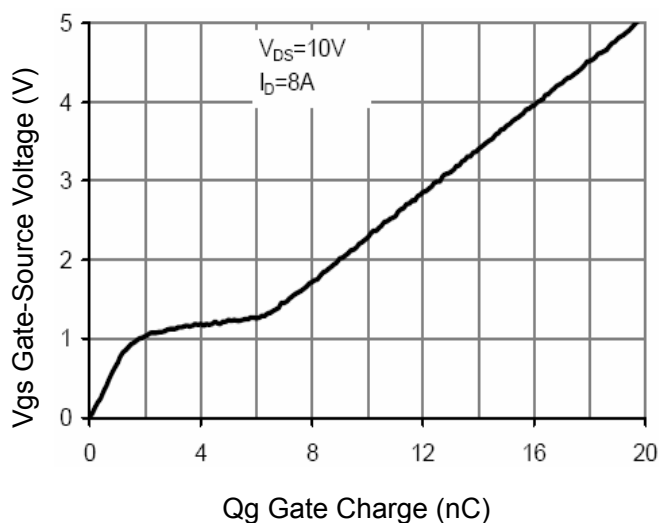


Figure 11 Gate Charge

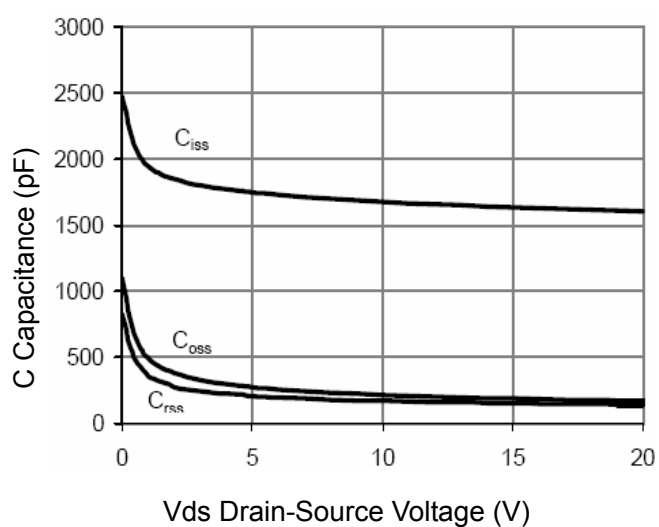


Figure 8 Capacitance vs Vds

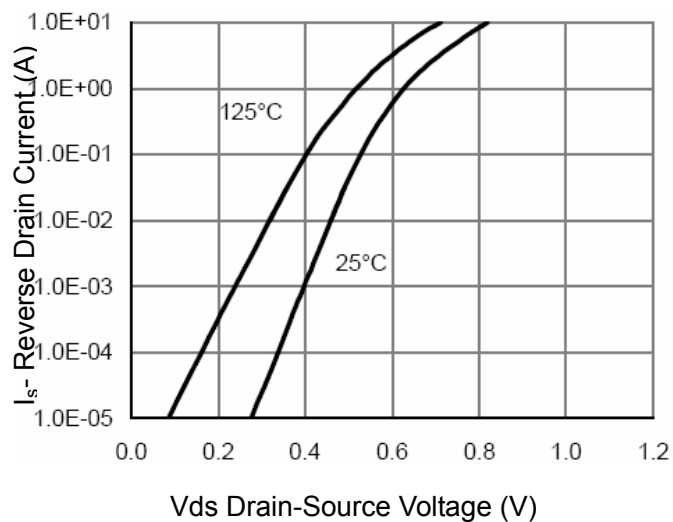


Figure 10 Source-Drain Diode Forward

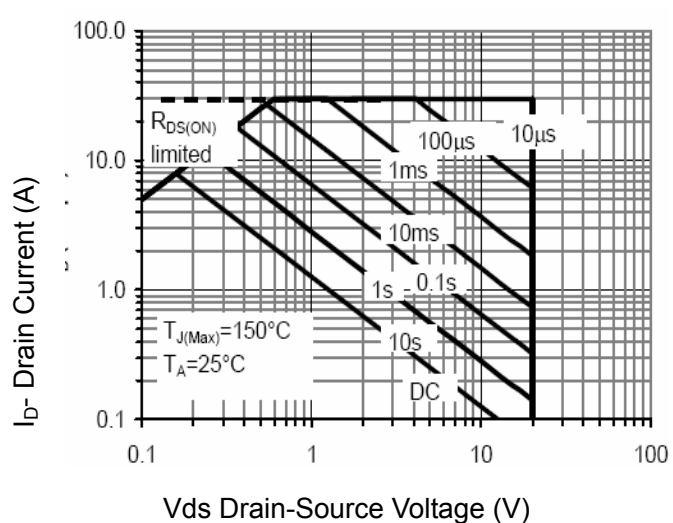


Figure 13 Safe Operation Area

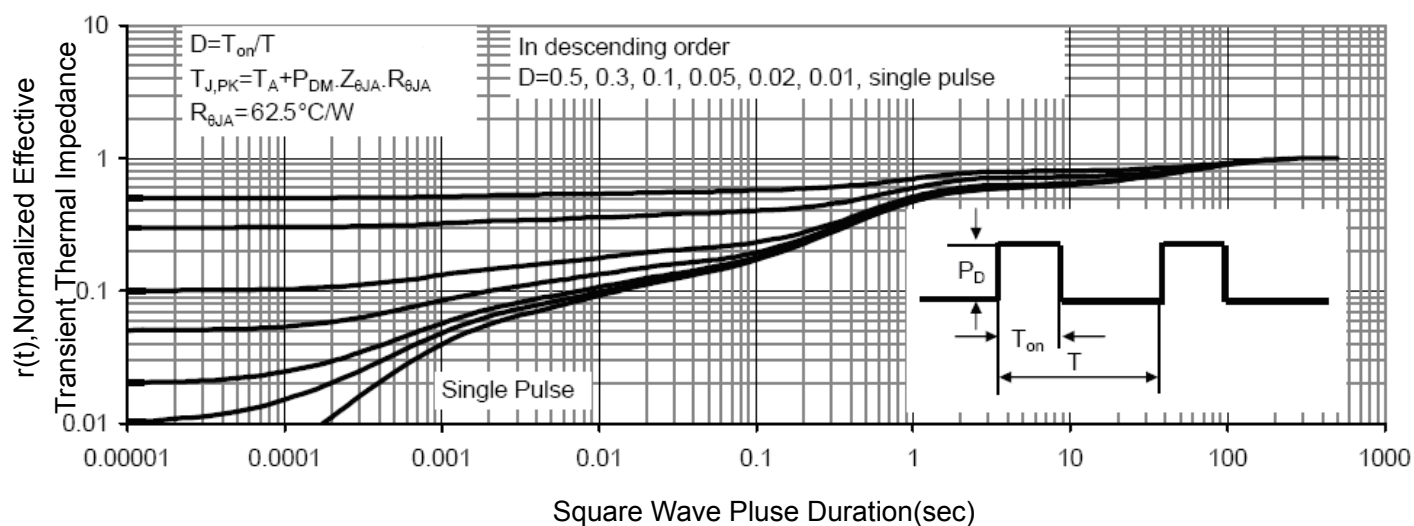
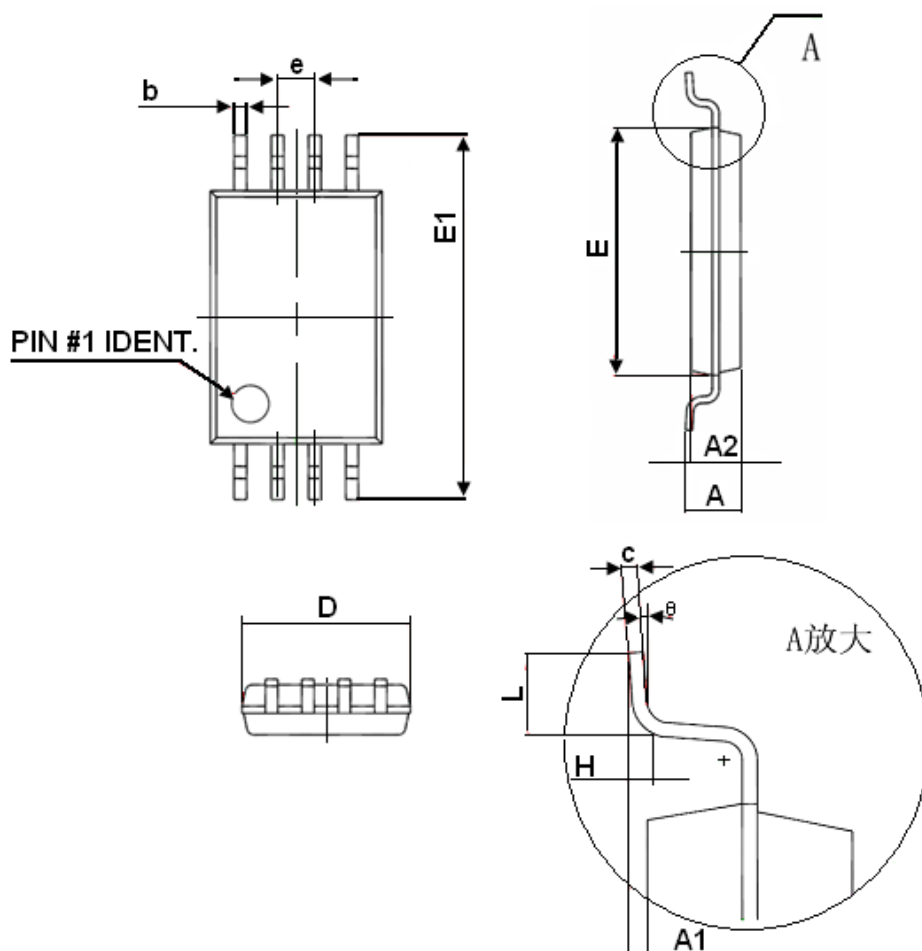


Figure 14 Normalized Maximum Transient Thermal Impedance

Tssop-8 Package Information


Symbol	Dimensions In Millimeters	
	Min	Max
D	2.900	3.100
E	4.300	4.500
b	0.190	0.300
c	0.090	0.200
E1	6.250	6.550
A		1.100
A2	0.800	1.000
A1	0.020	0.150
e	0.65(BSC)	
L	0.500	0.700
H	0.25(TYP)	
θ	1°	7°

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- All semiconductor products malfunction or fail with some probability under special conditions. When using FNK products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- FNK will supply the best possible product for customers!