

FNK N-Channel Enhancement Mode Power MOSFET

Description

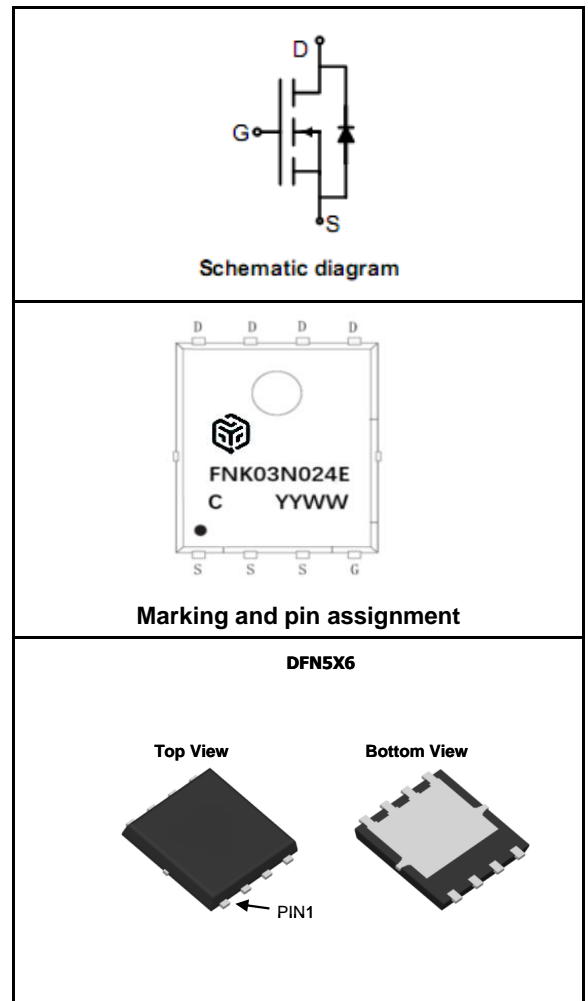
The FNK03N024E uses advanced trench technology and provide excellent $R_{DS(ON)}$ with low gate charge, it can be used in a wide variety of applications.

General Features

- $V_{DS} = 30V, I_D = 180A$
 $R_{DS(ON)} < 2.4m\Omega @ V_{GS}=10V$
 $R_{DS(ON)} < 5.0m\Omega @ V_{GS}=4.5V$
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high EAS
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and High frequency circuits
- Uninterruptible power supply



PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FNK03N024E	FNK03N024E	DFN5*6			

ABSOLUTE MAXIMUM RATINGS($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_D(25^{\circ}C)$	180	A
	I_{DM}	720	A
Maximum Power Dissipation	P_D	108	W
Single pulse avalanche energy(Note 5)	EAS	300	mJ

Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}\text{C}$
--	----------------	------------	--------------------

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	1.15	$^{\circ}\text{C/W}$
---	-----------------	------	----------------------

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

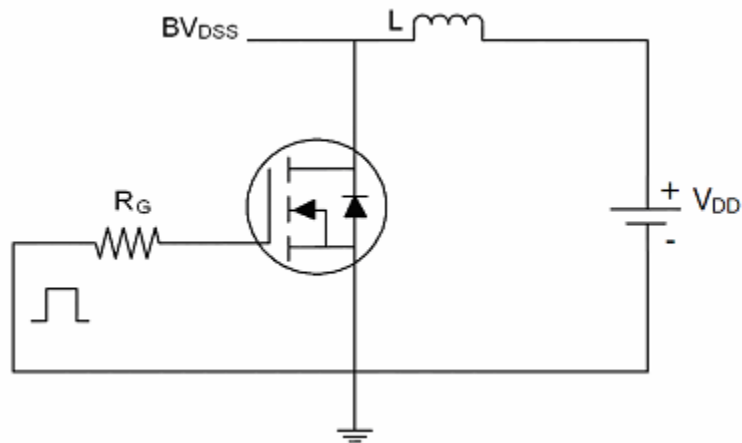
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V			1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =10A		2.0	2.4	mΩ
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =6A		3.6	5.0	mΩ
DYNAMIC CHARACTERISTICS (Note4)						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz		4945		PF
Output Capacitance	C _{oss}			908		PF
Reverse Transfer Capacitance	C _{rss}			493		PF
SWITCHING CHARACTERISTICS (Note 4)						
Delay Time	t _{d(on)}	V _{DS} =15V, V _{DS} =10V, R _{GEN} =6Ω R _L =1Ω, I _D =50A		19		nS
Turn-on Rise Time	t _r			94		nS
Turn-Off Delay Time	t _{d(off)}			28		nS
Turn-Off Fall Time	t _f			30		nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =20A, V _{GS} =10V		35		nC
Gate-Source Charge	Q _{gs}			11		nC
Gate-Drain Charge	Q _{gd}			10		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =40A			1.2	V
Diode Forward Current (Note 2)	I _S				40	A
Reverse Recovery Time	trr	T _J = 25℃, I _F =90A di/dt = 100A/us (Note3)		47		ns
Reverse Recovery Charge	Qrr			130		nc

NOTES:

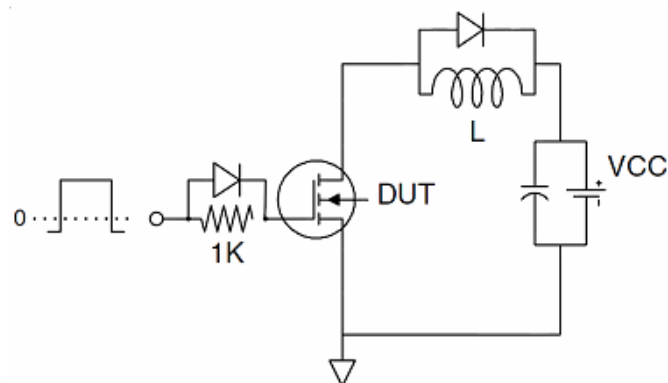
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on 1in² FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production testing
5. EAS condition $T_J=25^{\circ}\text{C}$, $V_{DD}=15V$, $V_G=10V$, $L=0.5mH$, $R_g=25$

Test circuit

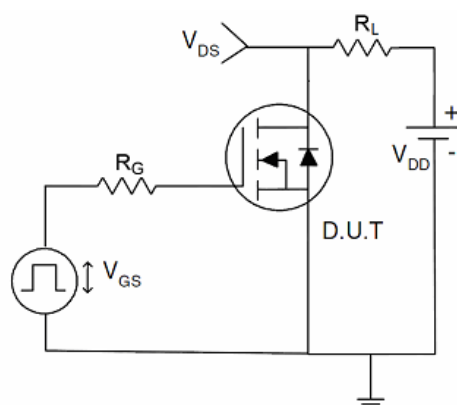
1) EAS test Circuits

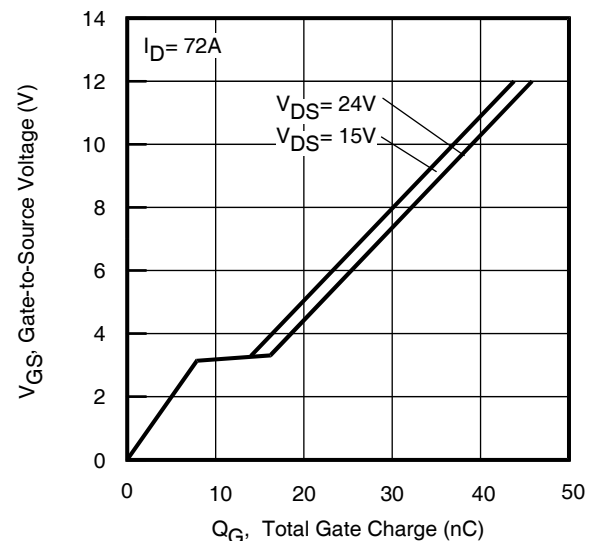
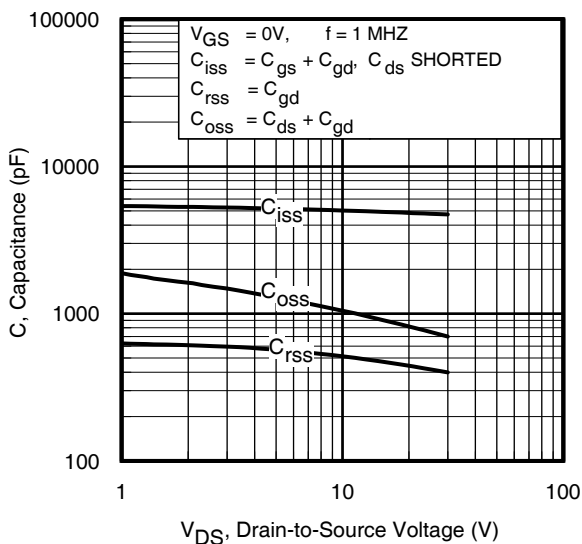
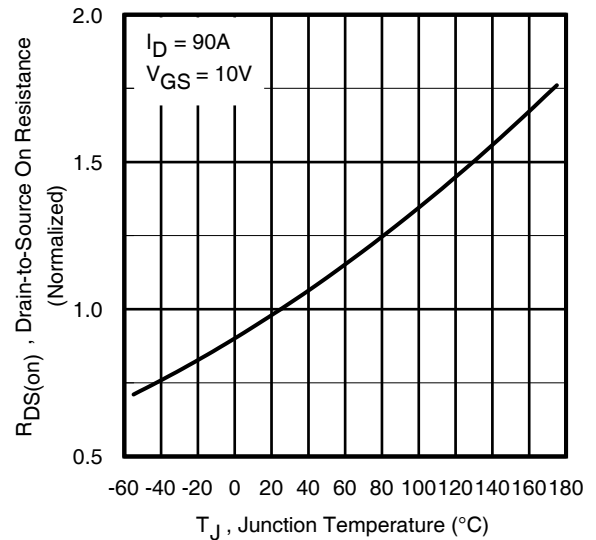
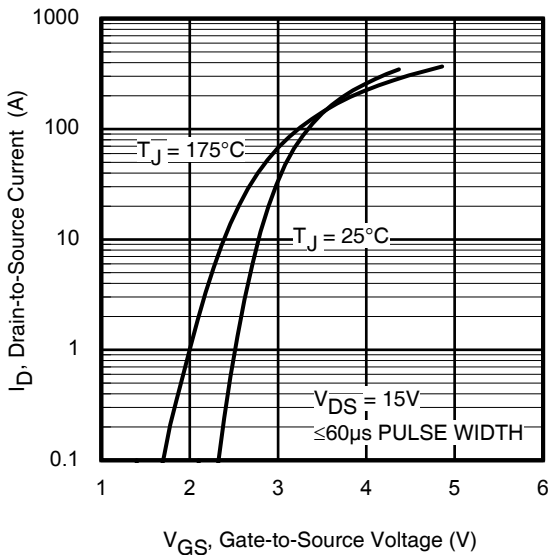
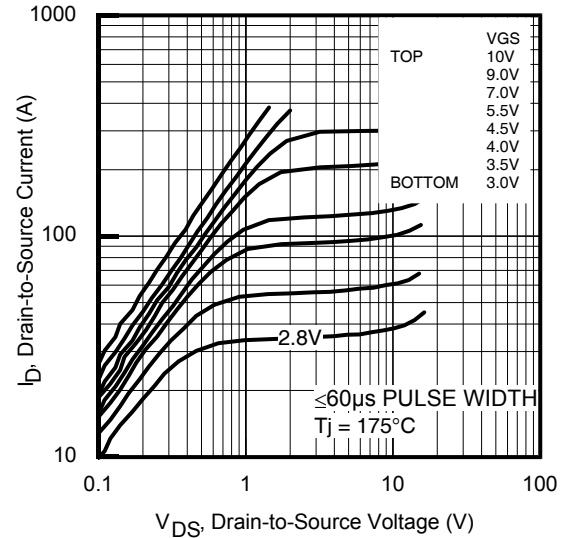
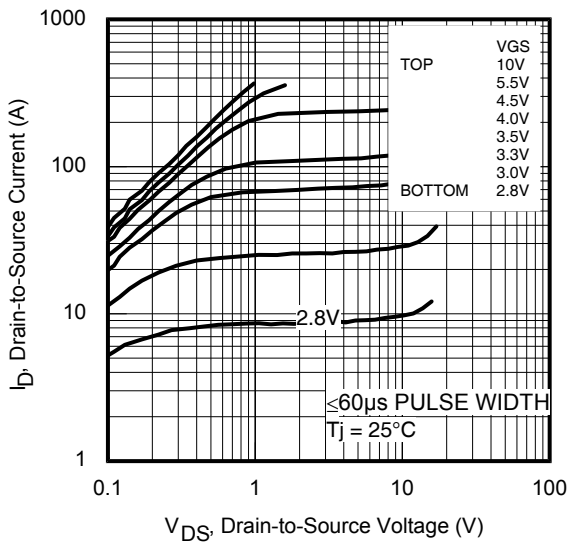


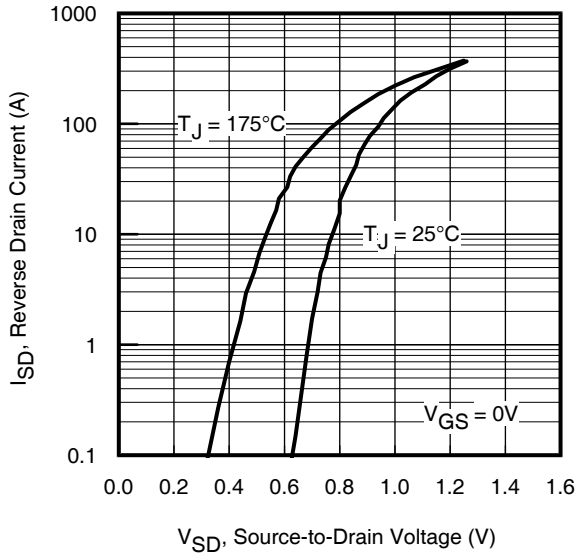
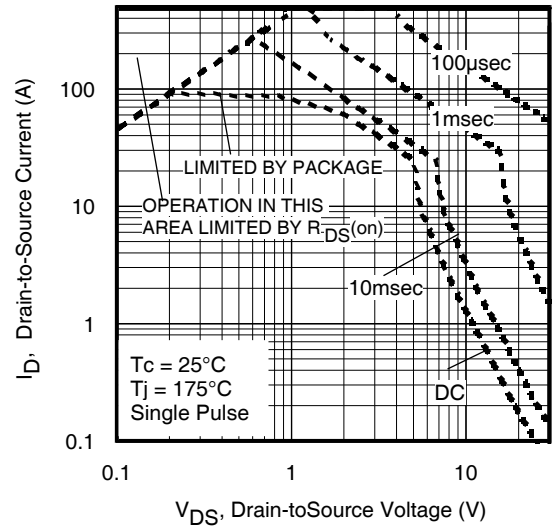
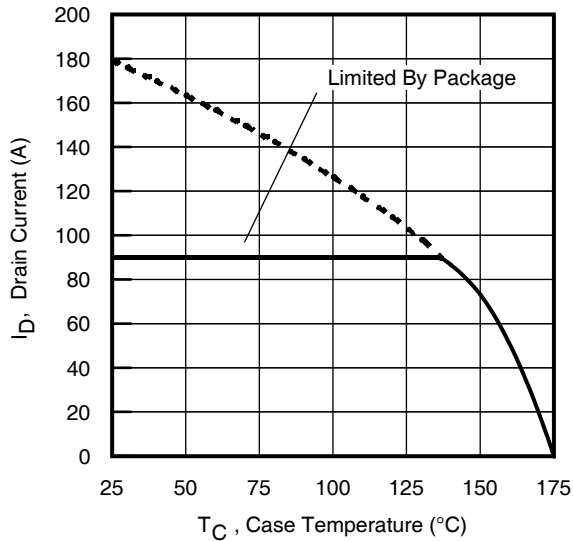
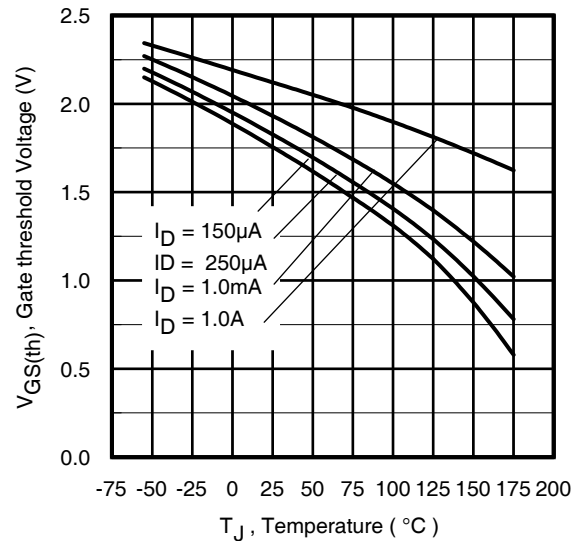
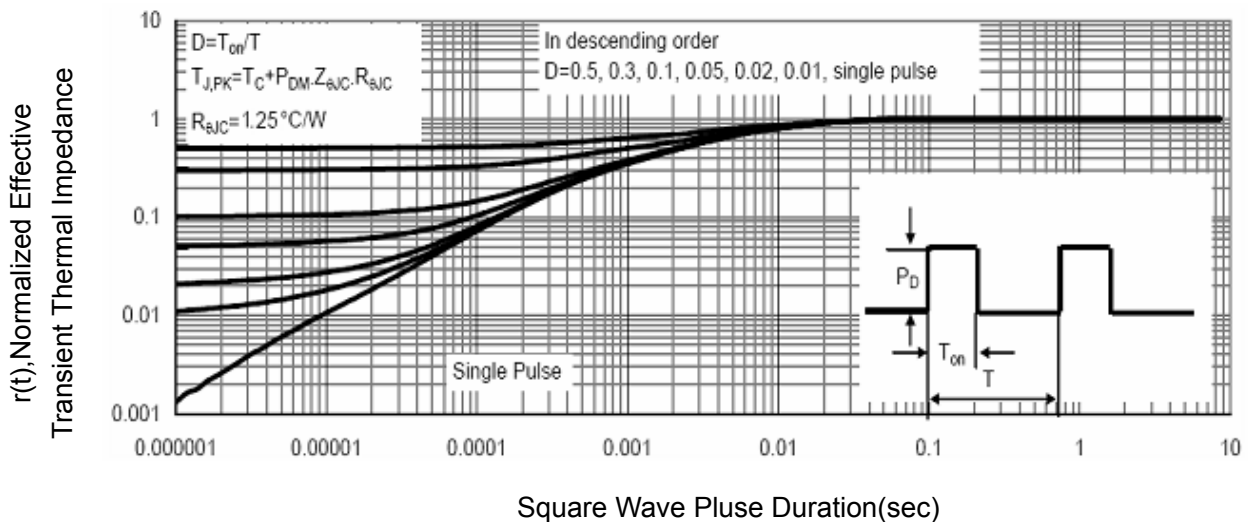
2) Gate charge test Circuit

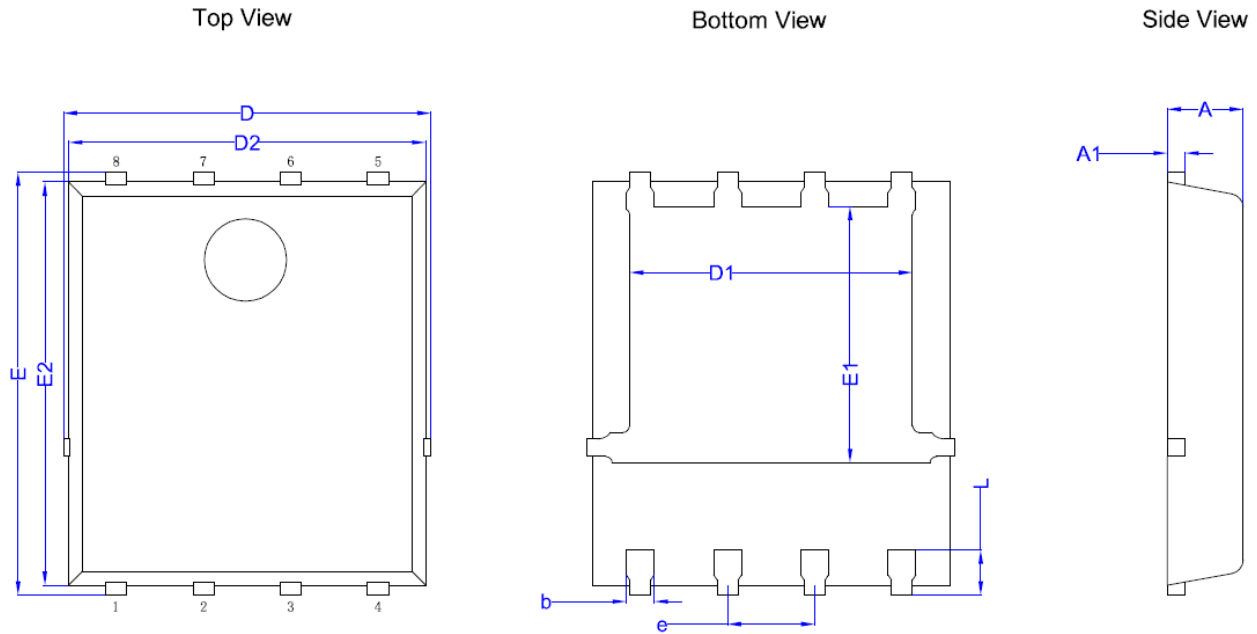


3) Switch Time Test Circuit



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 5. Typical Capacitance vs. Drain-to-Source Voltage
Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage


Fig 7. Typical Source-Drain Diode Forward Voltage

Fig 8. Maximum Safe Operating Area

Fig 9. Maximum Drain Current vs. Case Temperature

Fig 10. Threshold Voltage vs. Temperature

Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.00	1.10	1.20
A1	0.254 BSC		
D	5.15	5.35	5.55
E	5.95	6.15	6.35
D1	3.92	4.12	4.32
E1	3.52	3.72	3.92
D2	5.00	5.20	5.40
E2	5.66	5.86	6.06
e	1.27BSC		
b	0.31	0.41	0.51
L	0.56	0.66	0.76

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.
- FNK strives 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!