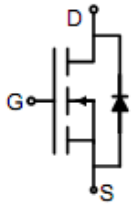
FNK03N024A

FNK N-Channel Enhancement Mode Power MOSFET

Description

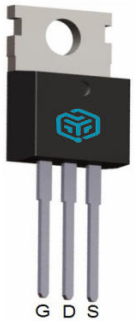
The FNK03N024A uses advanced trench technology and provide excellent $R_{DS(ON)}$ with low gate charge, it can be used in a wide variety of applications.



Schematic diagram

General Features

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



To-220 Top View

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
FNK03N024A	FNK03N024A	TO-220			

ABSOLUTE MAXIMUM RATINGS(TA=25℃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℃)	180	A
	I_{DM}	720	A
Maximum Power Dissipation	P_D	140	W
Single pulse avalanche energy(Note 5)	EAS	300	mJ

Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta Jc}$	0.88	℃/W

ELECTRICAL CHARACTERISTICS (TA=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	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			2.4	mΩ
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=6A			5.0	mΩ
DYNAMIC CHARACTERISTICS (Note4)						
Input Capacitance	C_{lss}	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,ID=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)	Is				40	A
Reverse Recovery Time	trr	TJ = 25℃, IF =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 1in^2 FR4 Board, t ≤ 10 sec.

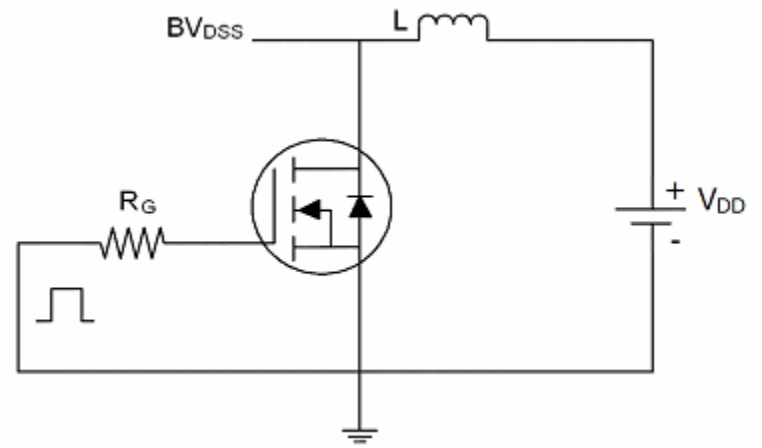
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production testing

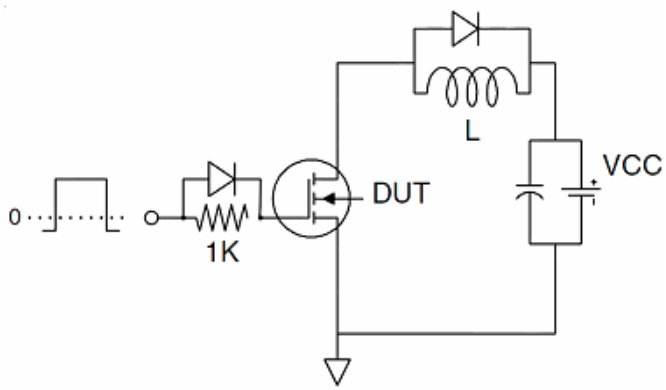
5.EAS condition Tj=25 ,VDD=15V,VG=10V,L=0.5mH,Rg=25

Test circuit

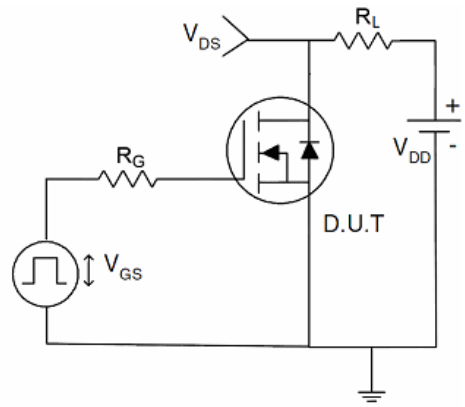
1) EAS test Circuits



2) Gate charge test Circuit



3) Switch Time Test Circuit



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

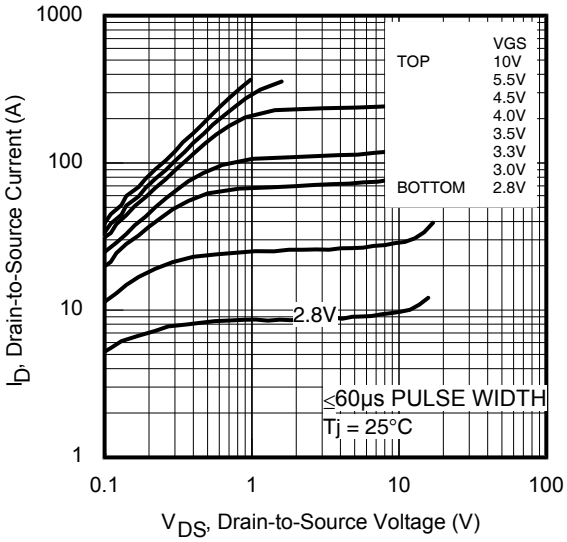


Fig 1. Typical Output Characteristics

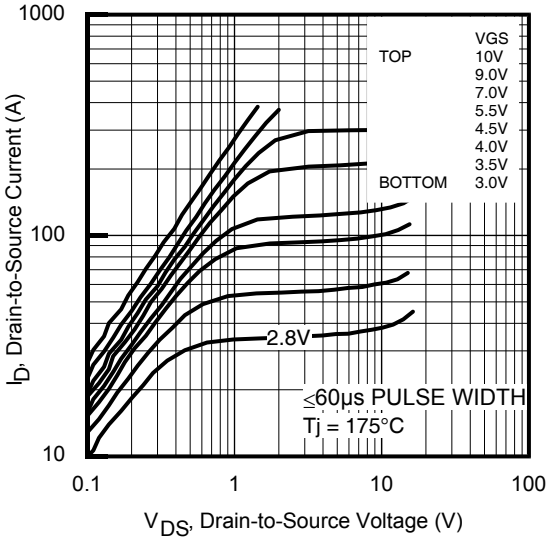


Fig 2. Typical Output Characteristics

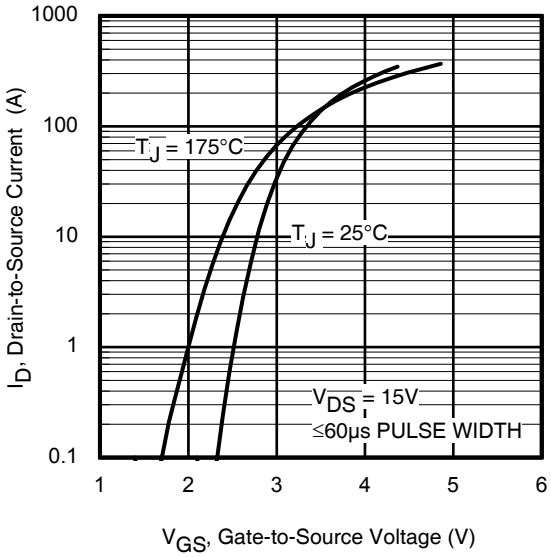


Fig 3. Typical Transfer Characteristics

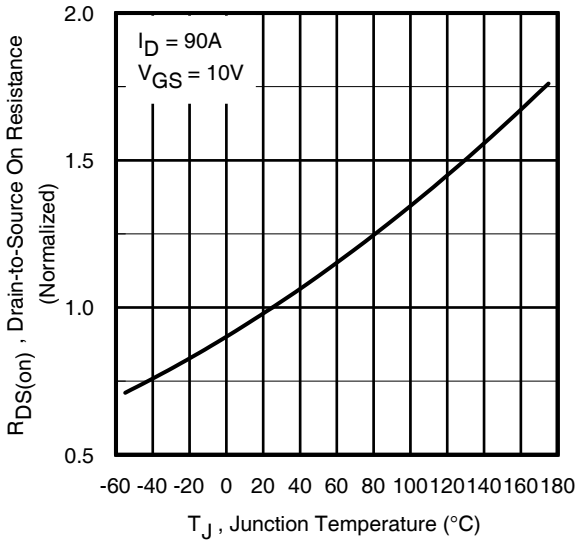


Fig 4. Normalized On-Resistance vs. Temperature

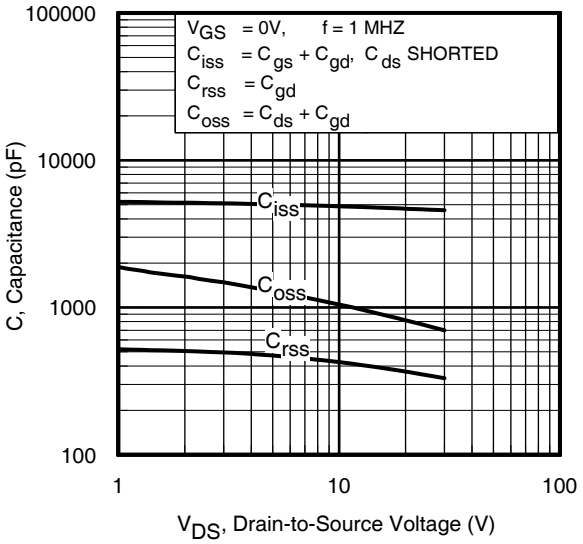


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

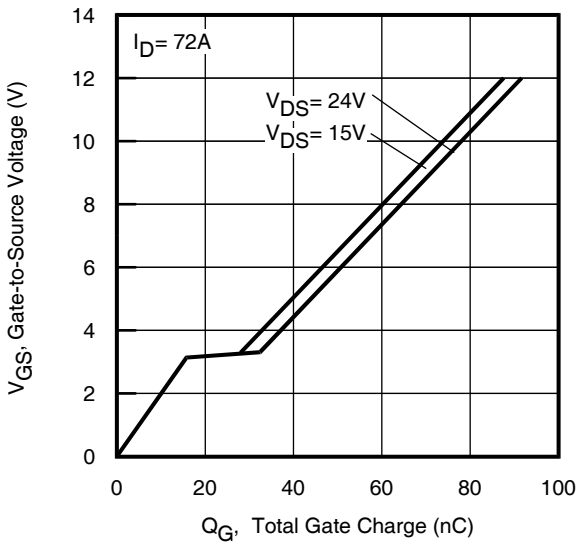


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

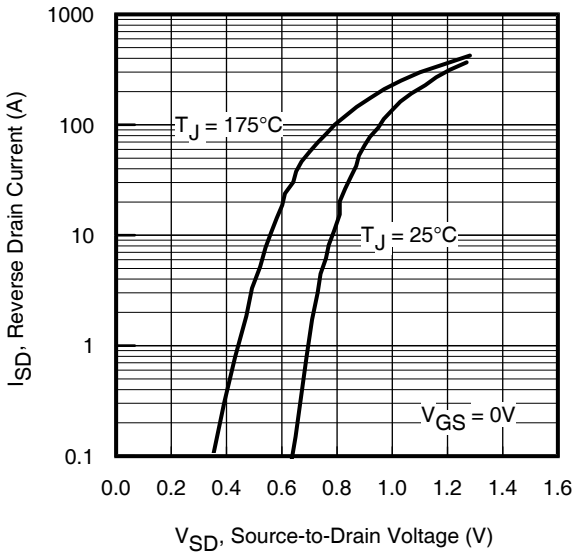


Fig 7. Typical Source-Drain Diode Forward Voltage

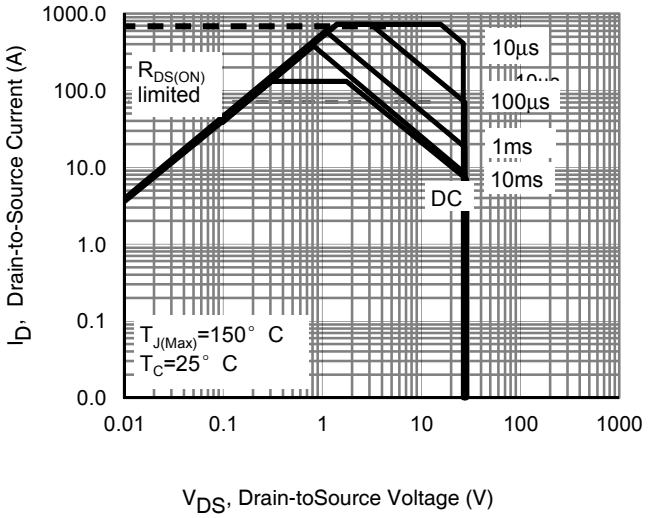


Fig 8. Maximum Safe Operating Area

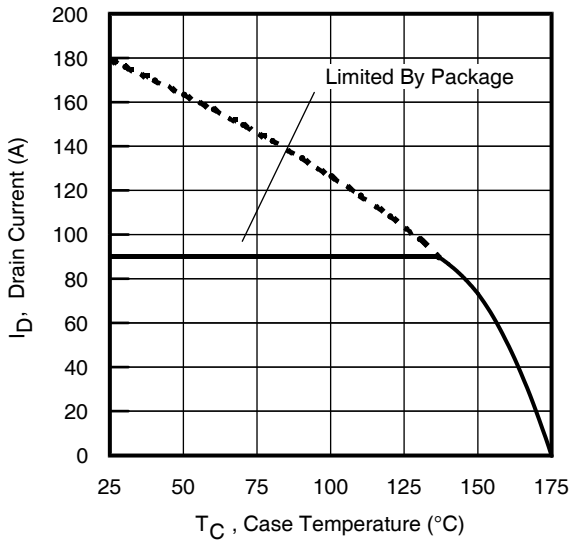


Fig 9. Maximum Drain Current vs. Case Temperature

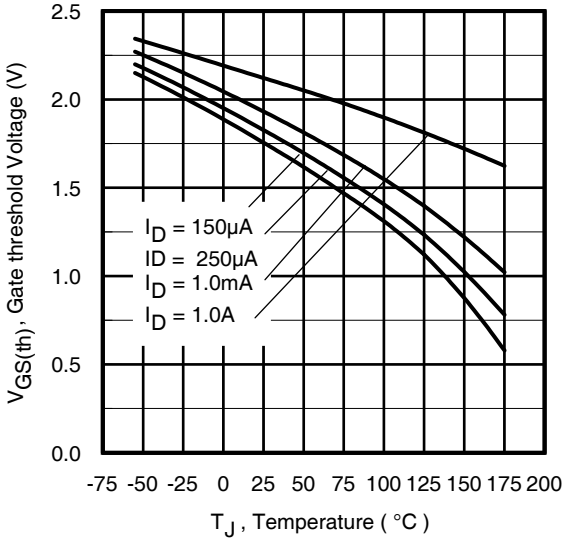


Fig 10. Threshold Voltage vs. Temperature

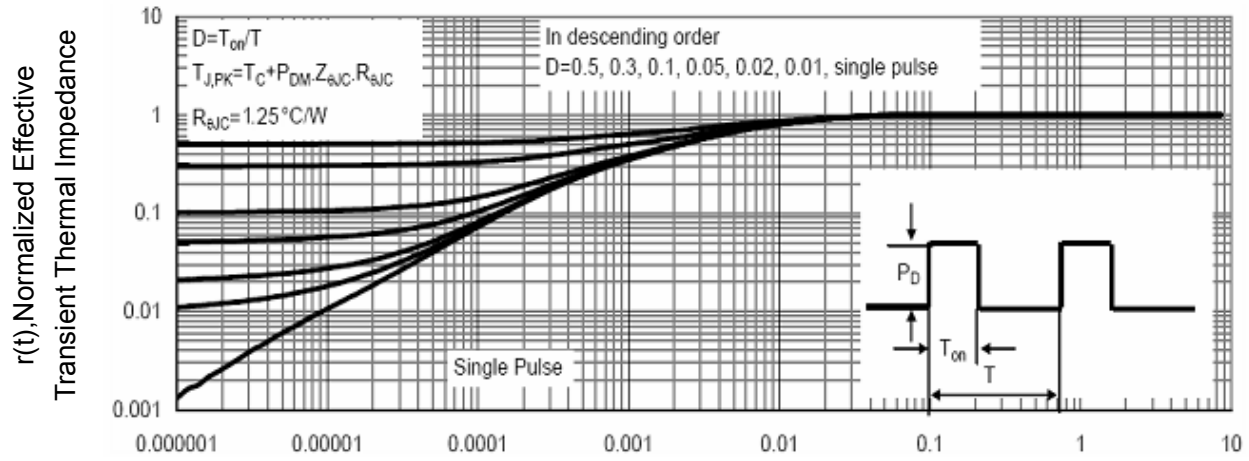
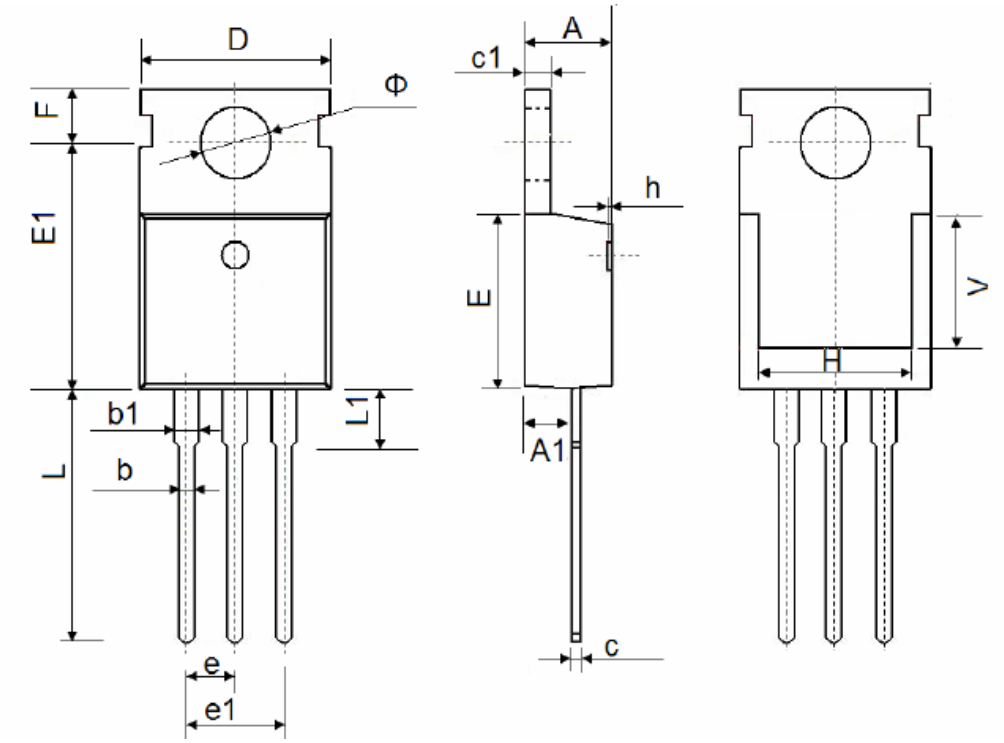


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150

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