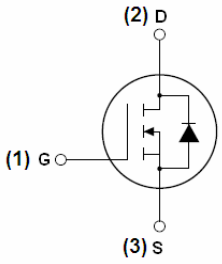
FNK1404

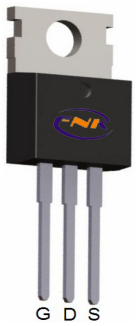
FNK N-Channel Power MOSFET

Description

The FNK1404 uses advanced trench technology and design to provide excellent Rds(on) with low gate charge. It can be used in a wide variety of applications.



Schematic diagram



To-220 Top View

General Features

- VDS =45V ,ID =205A
  Rds(on) <4mΩ @ Vgs=10V (Typ:2.8mΩ)
- 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
- Special process technology for high ESD capability

Application

- E-Tools
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Package Marking and Ordering Information

Device Marking	Device Package	Form	Minimum Quantity
FNK1404	TO-220	Tube	1000

Absolute Maximum Ratings

Symbol	Parameter	Max.	Unit
Vds	**Drain-Source Voltage**	**45**	**V**
Vgs	**Gate-Source Voltage**	**±20**	**V**
Id (25℃)	**Drain Current-Continuous (Tc = 25℃)**	**205**	**A**
Id (100℃)	**Drain Current-Continuous (Tc = 100℃)**	**140**	**A**
Idm	**Pulsed Drain Current (Note 1,3)**	**820**	**A**
Pd	**Maximum Power Dissipation**	**300**	**W**
EAS	**Single pulse avalanche energy (Note 5)**	**1010**	**mJ**
Tj	**Operating Junction and Storage Temperature Range**	**-55—175**	**℃**
$R_{\theta JC}$	**Thermal Resistance,Junction-to-Case (Note 2)**	**0.5**	**℃/W**
$R_{\theta JA}$	**Thermal Resistance,Junction-to-Ambient**	**65**	**℃/W**

I_{DSS}	Zero Gate Voltage Drain Current	—	—	5	uA	VGS=0V,VDS=V_{DS}
I_{GSS}	Gate-Body Leakage Current	—	—	±100	nA	VGS=±20V,VDS=0V
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	2.5	3.0	3.5	V	VDS=VGS,ID=250μA
$R_{DS(ON)}$@10	Drain-Source On-State Resistance	—	2.8	4.2	mΩ	VGS=10V, ID=Id/4
gfs	Forward Transconductance	—	78	—	S	VDS=V_{DS}/2,ID=Id/4
Dynamic Characteristics (Note4)						
Ciss	Input Capacitance	—	8120	—	pF	VDS=V_{DS}/2 VGS=0V F=1.0MHz
Coss	Output Capacitance	—	1370	—	pF	
Crss	Reverse Transfer Capacitance	—	910	—	pF	
Switching Characteristics (Note 4)						
Td(on)	Turn-on Delay Time	—	19	—	nS	VDS=V_{DS}*0.75 ID=Id/2 RG=2.5Ω VGS=10V
Tr	Turn-on Rise Time	—	206	—	nS	
Td(off)	Turn-Off Delay Time	—	53	—	nS	
Tf	Turn-Off Fall Time	—	38	—	nS	
Qg	Total Gate Charge	—	135	200	nC	ID=Id/2 VDS=V_{DS}*0.75 VGS=10V
Qgs	Gate-Source Charge	—	40	65	nC	
Qgd	Gate-Drain Charge	—	42	71	nC	
Rg	Gate-Drain Charge	2.1	2.8	3.5	Ω	F=1MHz, open drain
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage (Note 3)	—	0.65	1	V	IS=Id/2,VGS=0V
Trr	Reverse Recovery Time	—	85	125	nS	IF=Id/2,VR=VDS*0.75 di/dt = 100A/μs
Qrr	Reverse Recovery Charge	—	173	240	nC	
Ton	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

①.Repetitive Rating: Pulse width limited by maximum junction temperature.

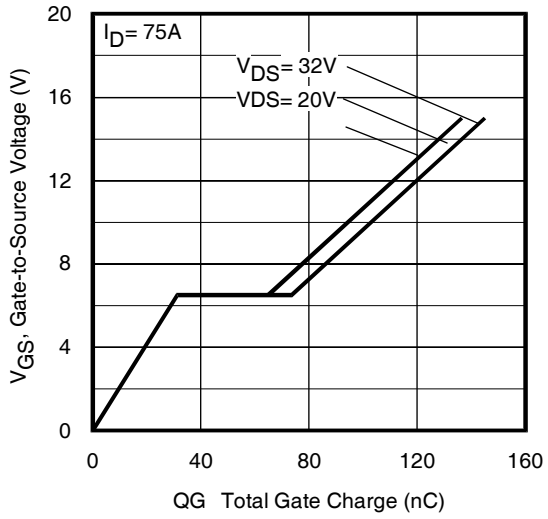
②.Surface Mounted on FR4 Board, t ≤ 10 sec.

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

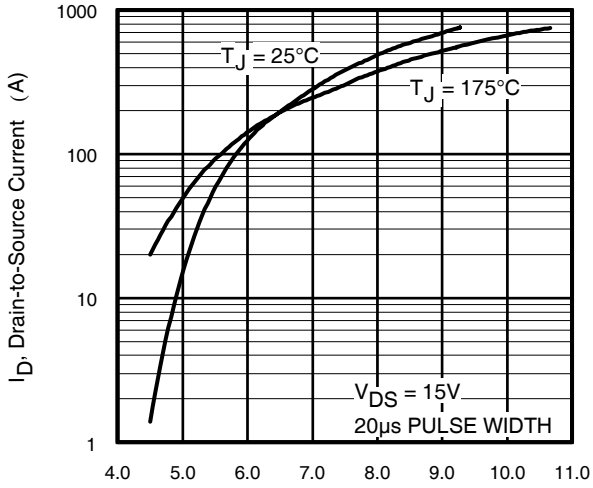
④. Guaranteed by design, not subject to production

⑤. EAS condition：Tj=25℃,VDD=40V,VG=10V,L=0.5mH,Rg=25Ω

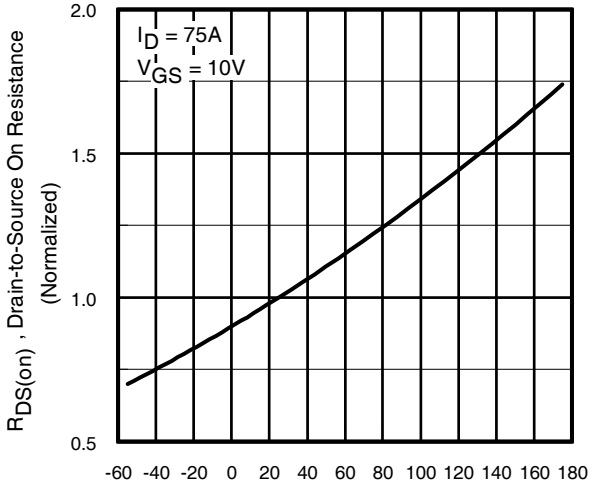
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



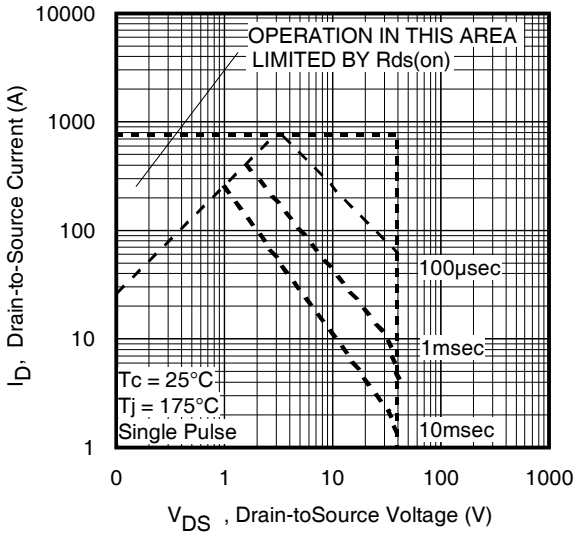
Typical Gate Charg



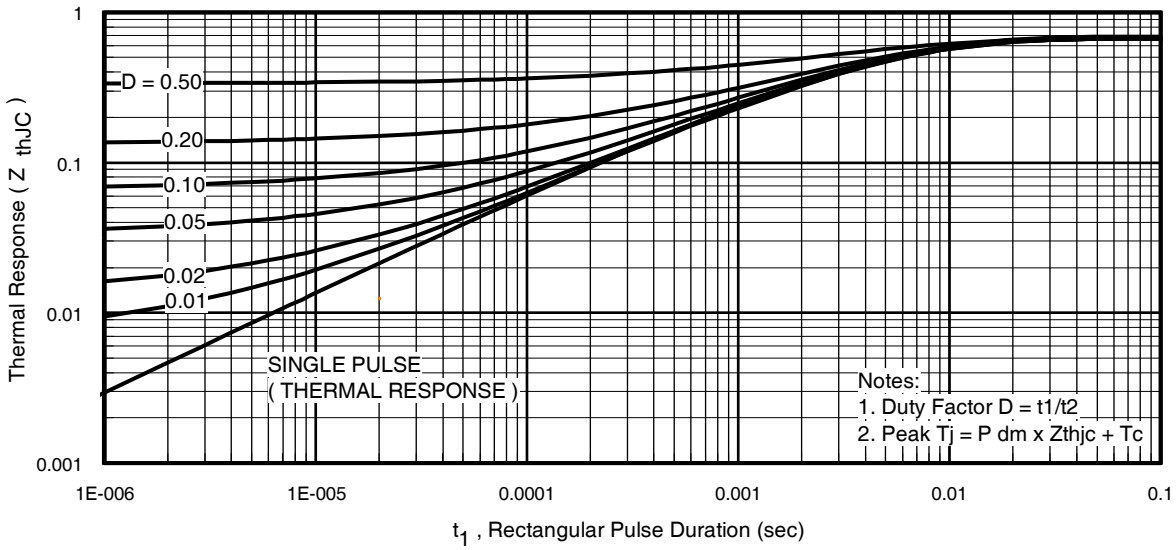
Typical Transfer Characteristics



Normalized On-Resistance
Vs. Temperature



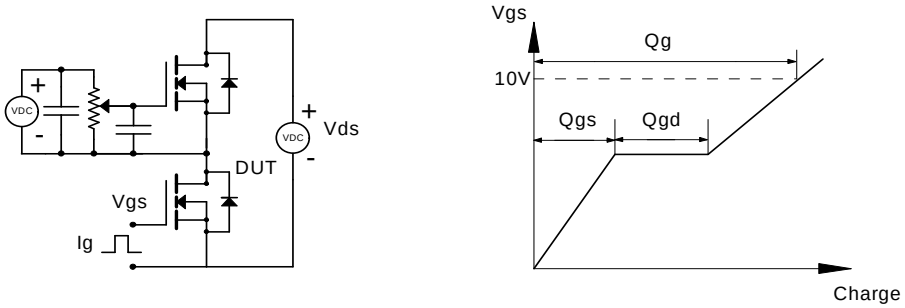
Maximum Safe Operating Area



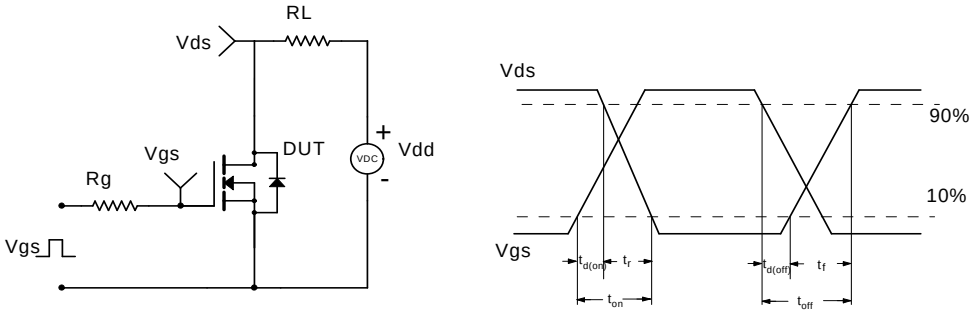
Maximum Effective Transient Thermal Impedance, Junction-to-Case

TEST CIRCUIT

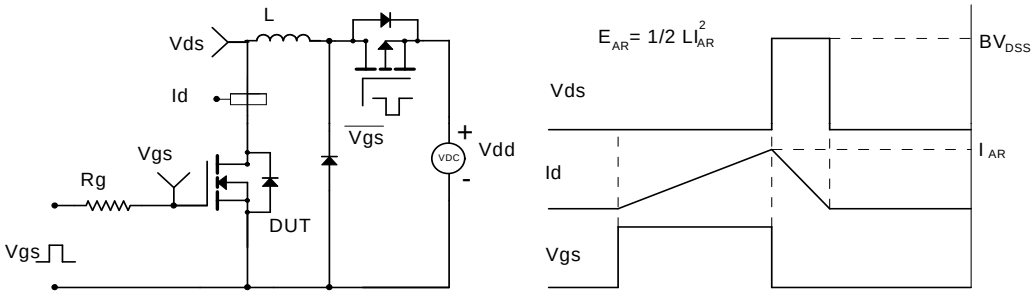
Gate Charge Test Circuit & Waveform



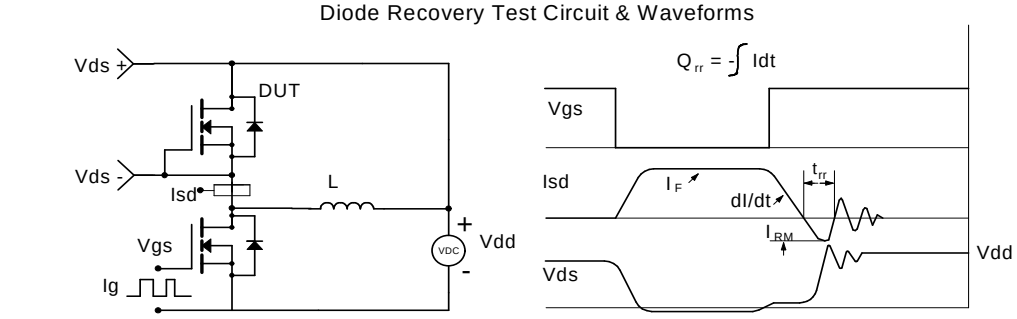
Resistive Switching Test Circuit & Waveforms



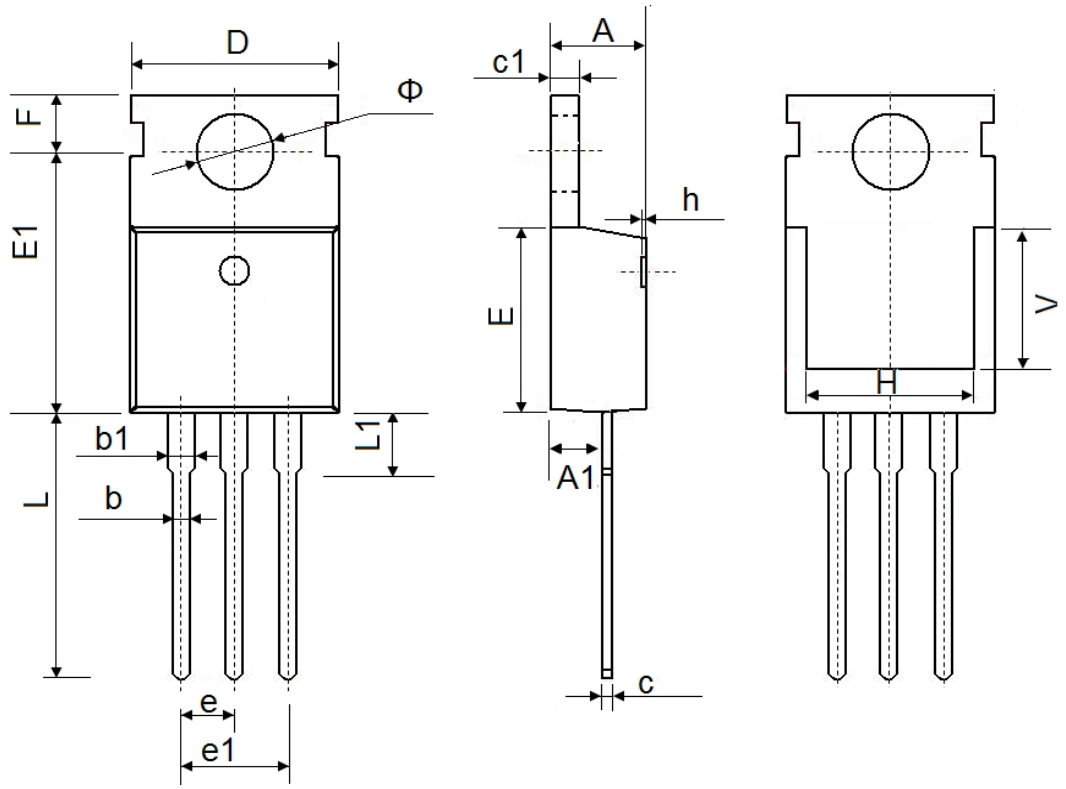
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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.		0.100TYP.	
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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