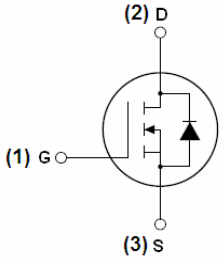
FNK N-Channel Enhancement Mode Power MOSFET

Description

The FNK03N02E uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.



Schematic diagram

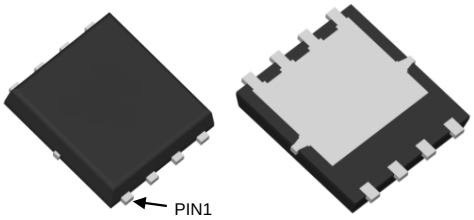
General Features

- V_{DS} =30V,I_D =140A
  $R_{DS(ON)}$ <3.0 mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ <4.0mΩ @ V_{GS}=4.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

DFN5X6

Application

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



Top View **Bottom View**

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FNK03N02E	FNK03N02E	DFN5x6-8L	-	-	-

Absolute Maximum Ratings (T_C=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	I_D	140	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	105	A
Pulsed Drain Current	I_{DM}	560	A
Maximum Power Dissipation	P_D	130	W
Derating factor		0.87	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	240	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

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

Electrical Characteristics (T_C=25℃unless otherwise noted)

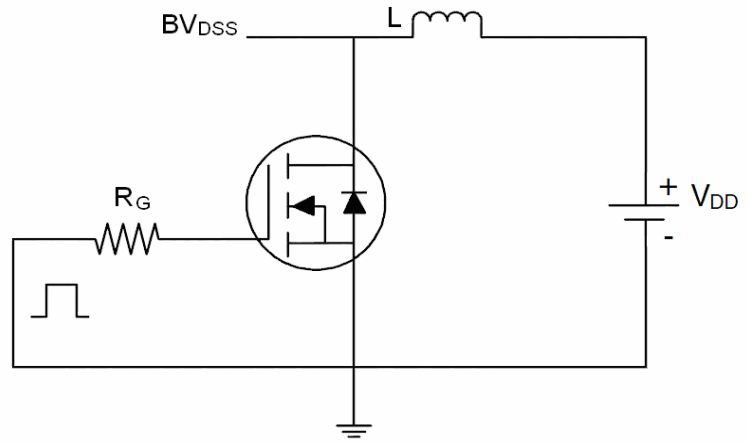
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	30	34	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.0	1.2	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	2.1	3.4	mΩ
		V_{GS}=4.5V, I_D=10A		2.4	4.0	
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=20A	32	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=15V,V_{GS}=0V, F=1.0MHz	-	5400	-	PF
Output Capacitance	C_{oss}		-	720	-	PF
Reverse Transfer Capacitance	C_{rss}		-	560	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V,I_D=2A,R_L=15Ω V_{GS}=10V,R_G=2.5Ω	-	26	-	nS
Turn-on Rise Time	t_r		-	24	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	91	-	nS
Turn-Off Fall Time	t_f		-	39	-	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=30A, V_{GS}=10V	-	38		nC
Gate-Source Charge	Q_{gs}		-	9		nC
Gate-Drain Charge	Q_{gd}		-	13		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=150A	-		1.2	V
Diode Forward Current (Note 2)	I_S		-	-	150	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF = 20A di/dt = 100A/μs(Note3)	-	42	-	nS
Reverse Recovery Charge	Qrr		-	39	-	nC

Notes:

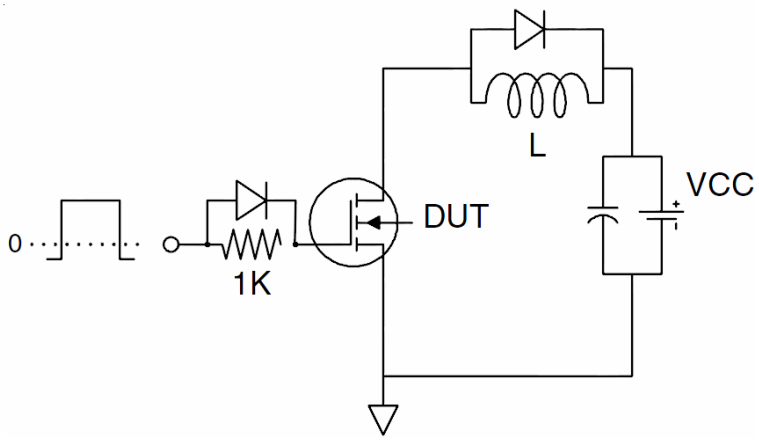
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : Tj=25℃,V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω，I_{AS}=58.5A

Test circuit

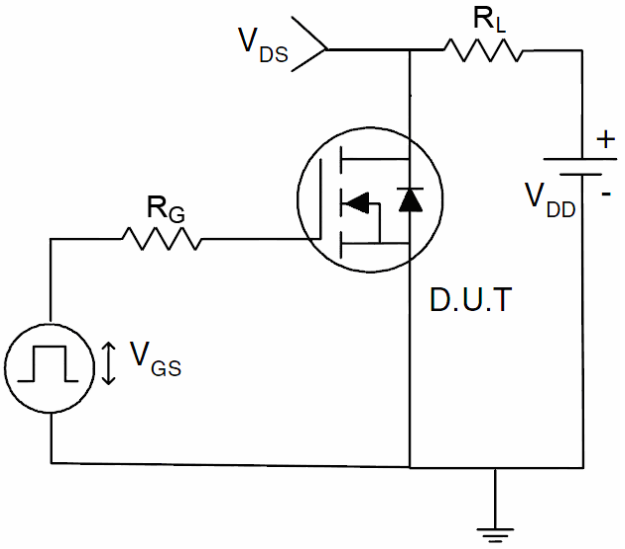
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

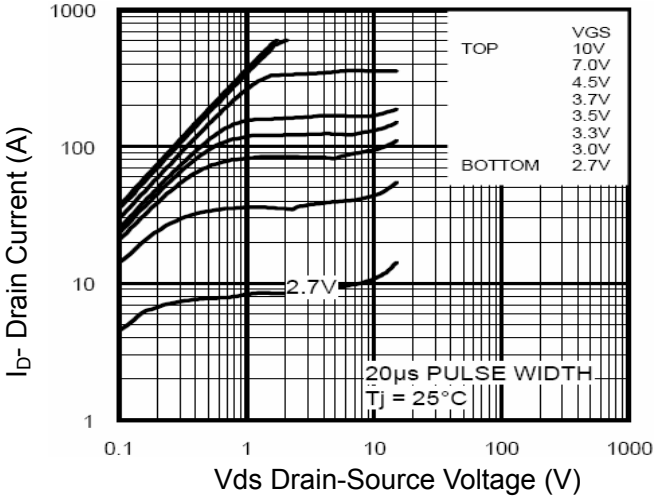


Figure 1 Output Characteristics

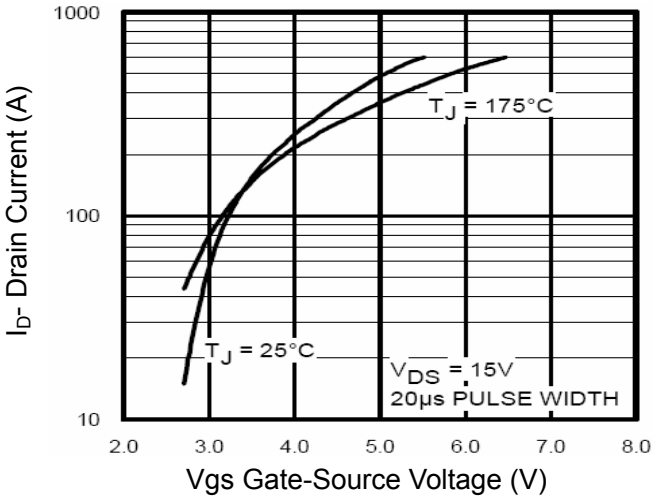


Figure 2 Transfer Characteristics

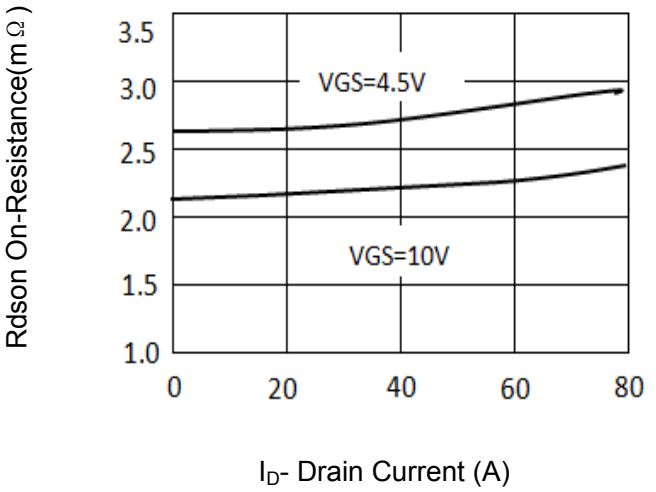


Figure 3 Rdson- Drain Current

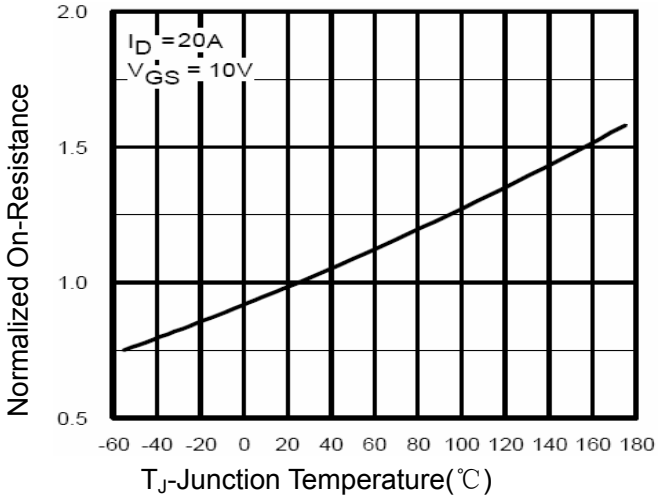


Figure 4 Rdson-JunctionTemperature

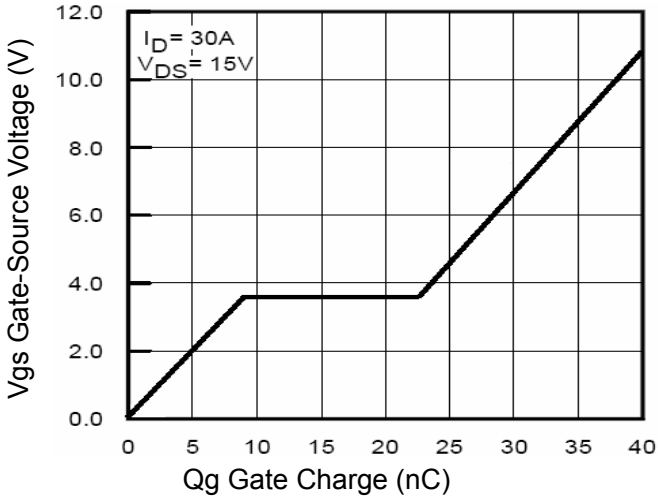


Figure 5 Gate Charge

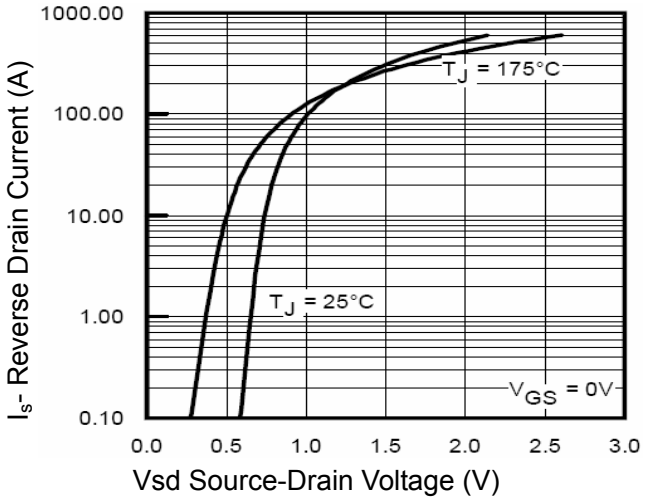


Figure 6 Source- Drain Diode Forward

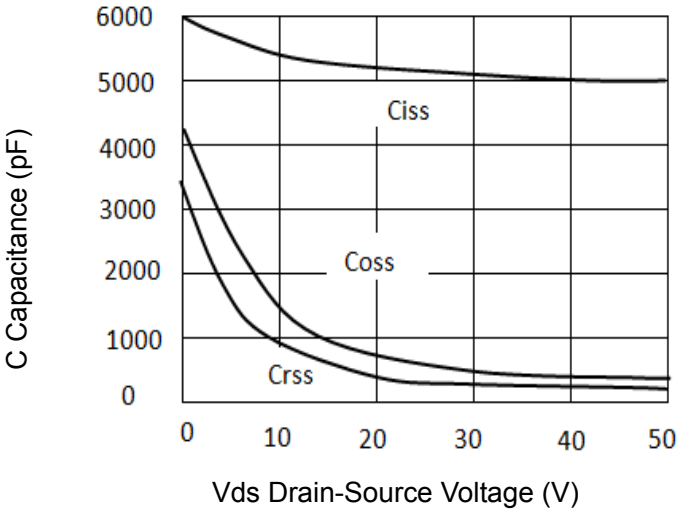


Figure 7 Capacitance vs Vds

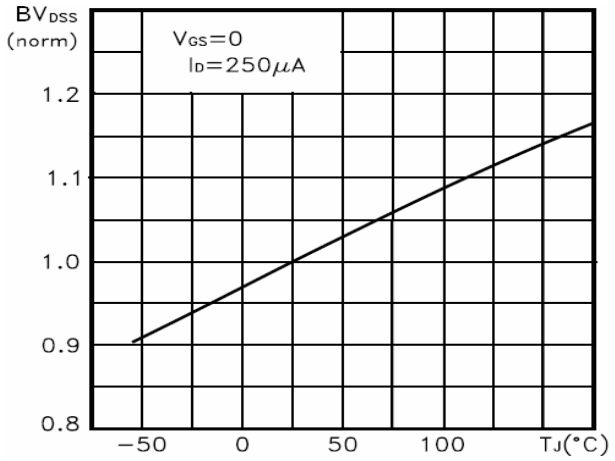


Figure 9 BV_{DSS} vs Junction Temperature

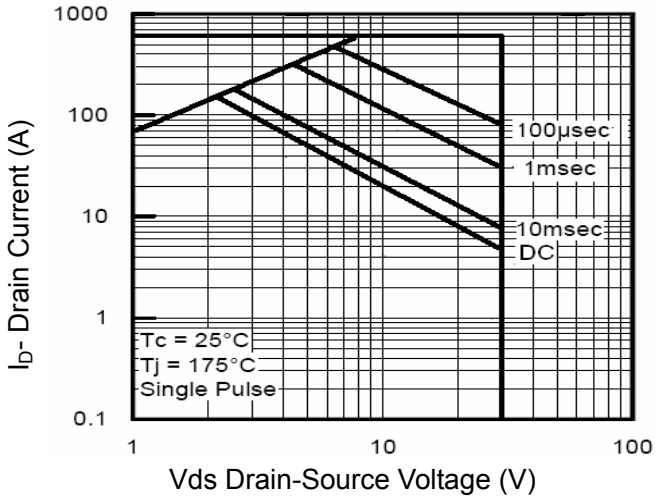


Figure 8 Safe Operation Area

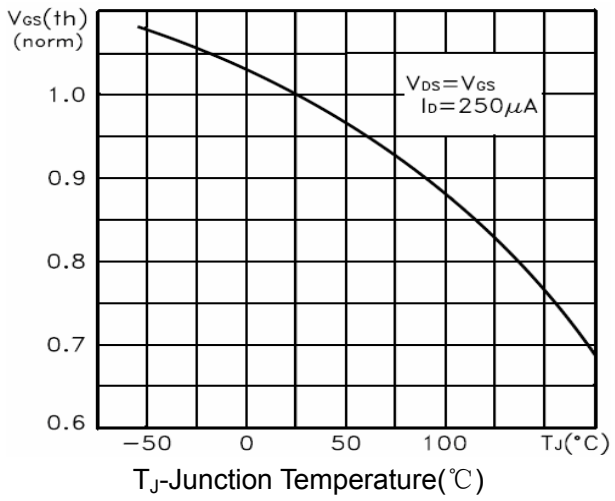


Figure 10 $V_{GS(th)}$ vs Junction Temperature

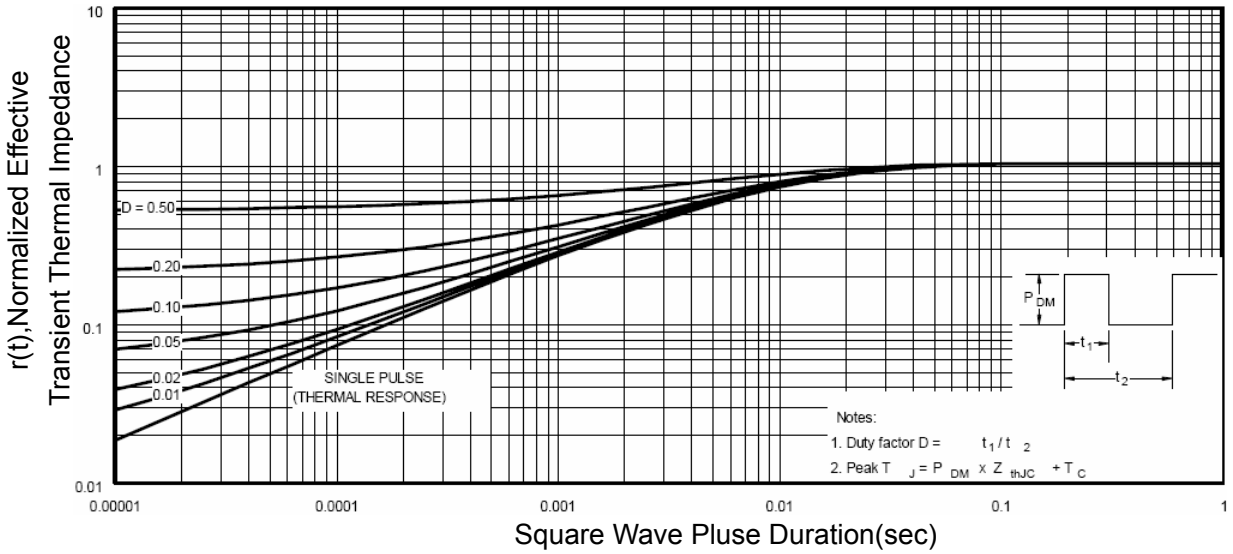
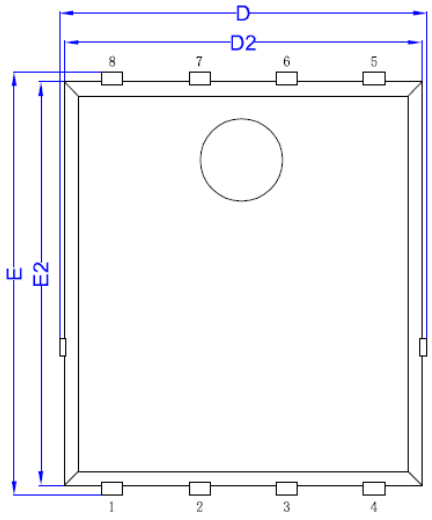


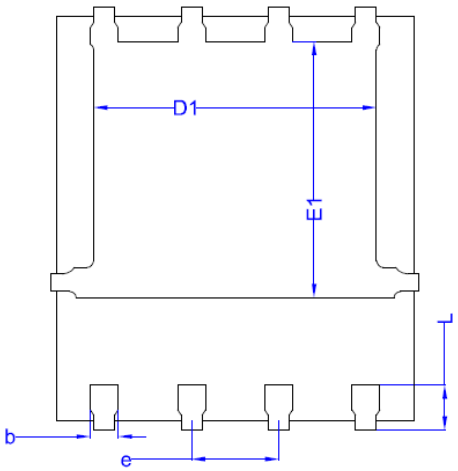
Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information

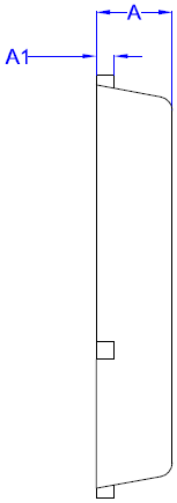
Top View



Bottom View



Side View



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

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