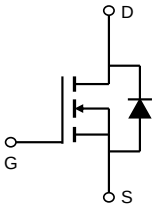
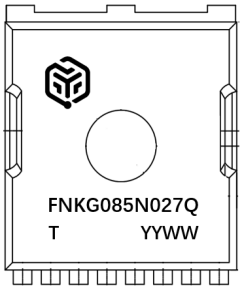
General Description

- Shielded Gate Transistor Power MOSFET
- Combined of low $R_{DS(ON)}$ and wide safe operatiing area (SOA)



Product Summary

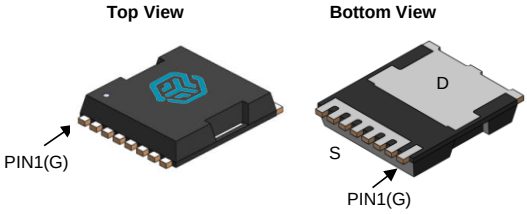
V_{DS}	85V
I_D (at V_{GS}=10V)	198A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 2.7mΩ



Applications

- Load switch
- BMS
- Motor

TOLL



Orderable Part Number	Package Type	Form	Minimum Order Quantity
FNKG085N027Q	TOLL	Tape & Reel	

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	85	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	198	A
Pulsed Drain Current [C] (≤100μS)	I_{DM}	790	
Avalanche energy L=0.3mH [C]	E_{AS}	400	mJ
Power Dissipation [B]	P_D	190	W
Power Dissipation [A]	P_{DSM}	10	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	10	15	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		35	45	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.65	0.83	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0V	85			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=100V, V_{GS}=0V			1	μA
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=$V_{GS,}$ I_D=250μA	2.0	2.8	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A		1.8	2.7	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		50		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V			1	V
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=40V, f=1MHz		6550		pF
C_{oss}	Output Capacitance			1450		pF
C_{rss}	Reverse Transfer Capacitance			60		pF
R_g	Gate resistance	f=1MHz		2.5	5	Ω
SWITCHING PARAMETERS						
$Q_{g(10V)}$	Total Gate Charge	V_{GS}=10V, V_{DS}=50V, I_D=20A		85	105	nC
Q_{gs}	Gate Source Charge			35		nC
Q_{gd}	Gate Drain Charge			25		nC
Q_{oss}	Output Charge	V_{GS}=0V, V_{DS}=50V		240		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=50V, R_L=3.75Ω, R_{GEN}=3Ω		25		ns
t_r	Turn-On Rise Time			22		ns
$t_{D(off)}$	Turn-Off DelayTime			51		ns
t_f	Turn-Off Fall Time			25		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, di/dt=500A/μs		82		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, di/dt=500A/μs		820		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 175° C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175° C may be used if the PCB allows it.
B. The power dissipation P_D is based on $T_{J(MAX)}$=175° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
C. Single pulse width limited by junction temperature $T_{J(MAX)}$=175° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175° C. The SOA curve provides a single pulse rating.
G. The maximum current rating is package limited.
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

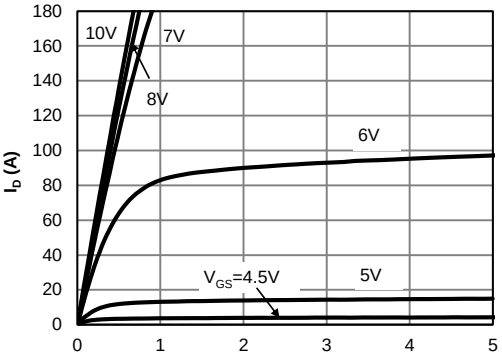


Figure 1: On-Region Characteristics (Note E)

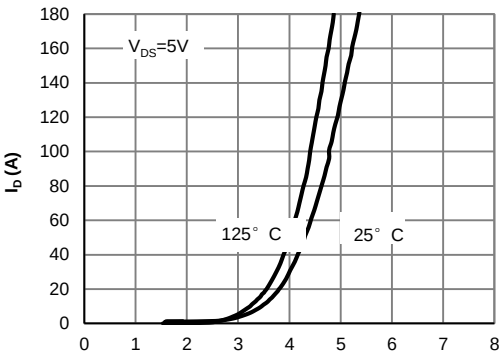


Figure 2: Transfer Characteristics (Note E)

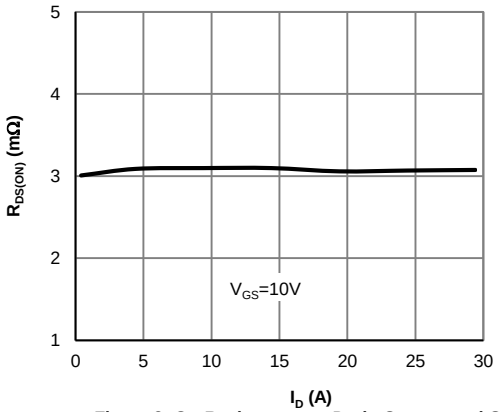


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

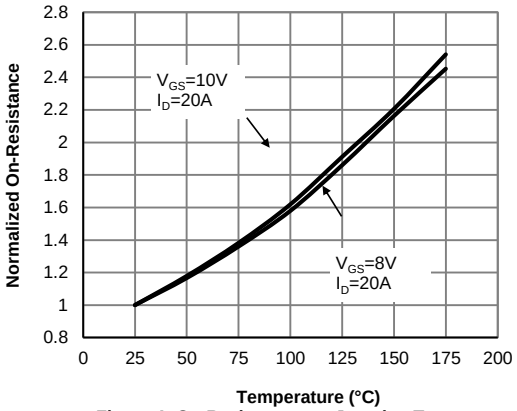


Figure 4: On-Resistance vs. Junction Temperature (Note E)

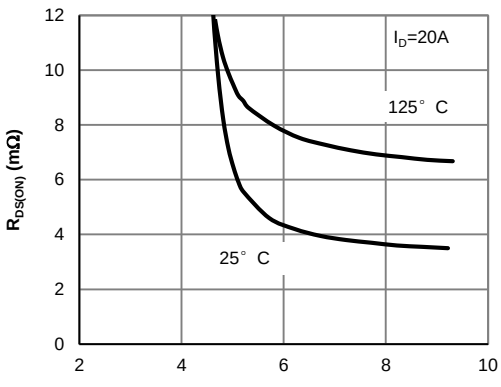


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

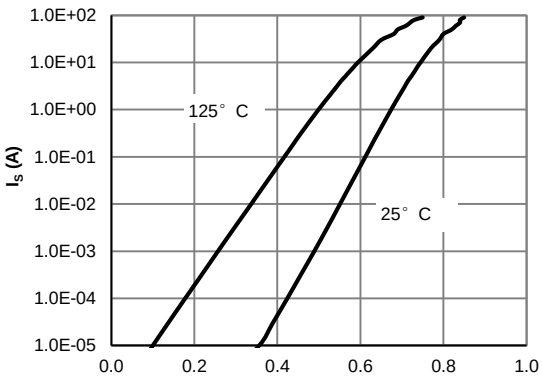


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

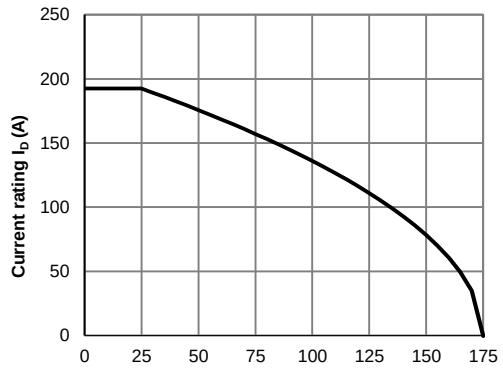


Figure 7: Current De -rating (Note F)

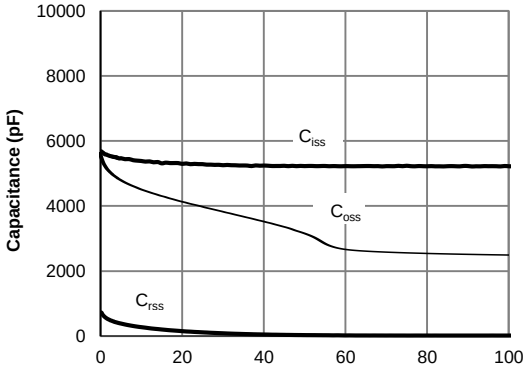
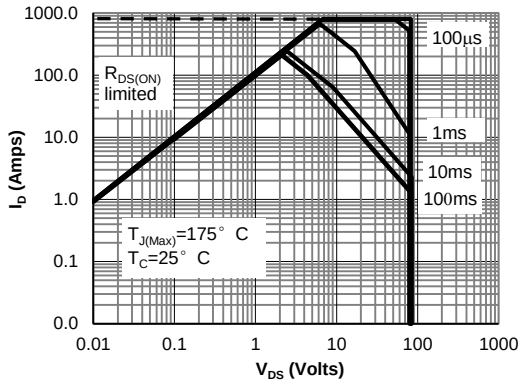


Figure 8: Capacitance Characteristics



V_{GS}> or equal to 8V

Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

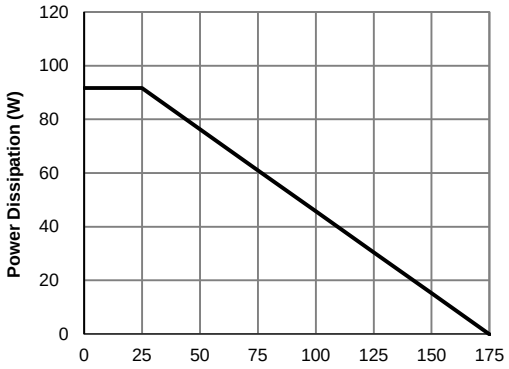


Figure 10: Power De-rating (Note F)

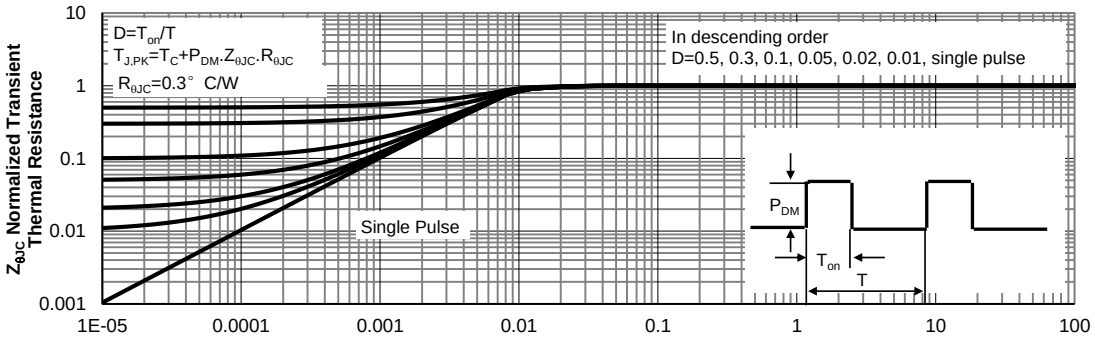


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Figure A: Gate Charge Test Circuit & Waveforms

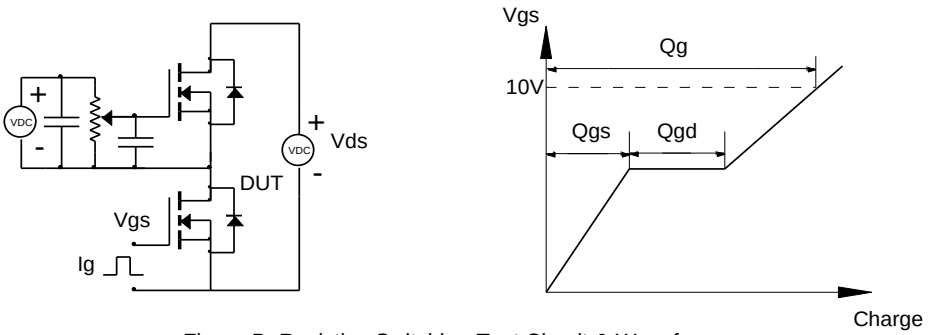


Figure B: Resistive Switching Test Circuit & Waveforms

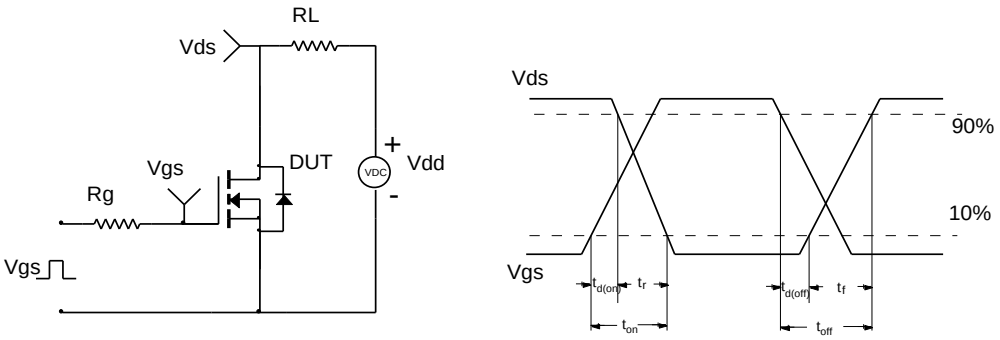


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

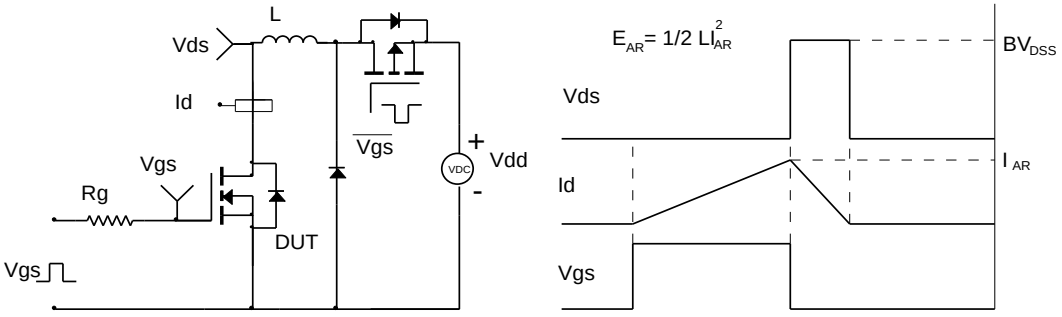
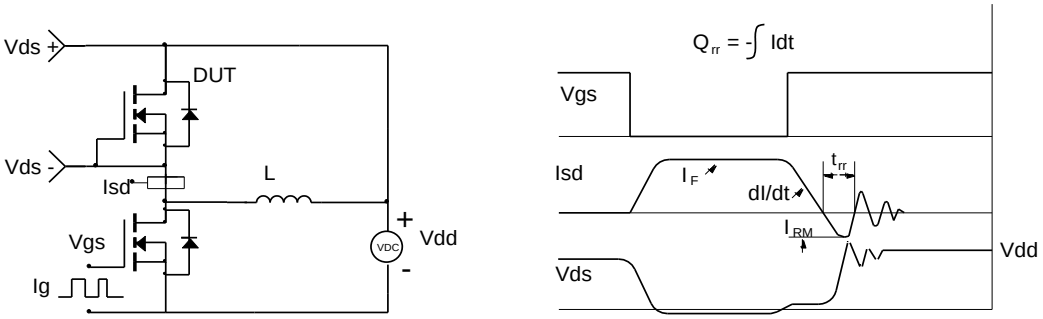
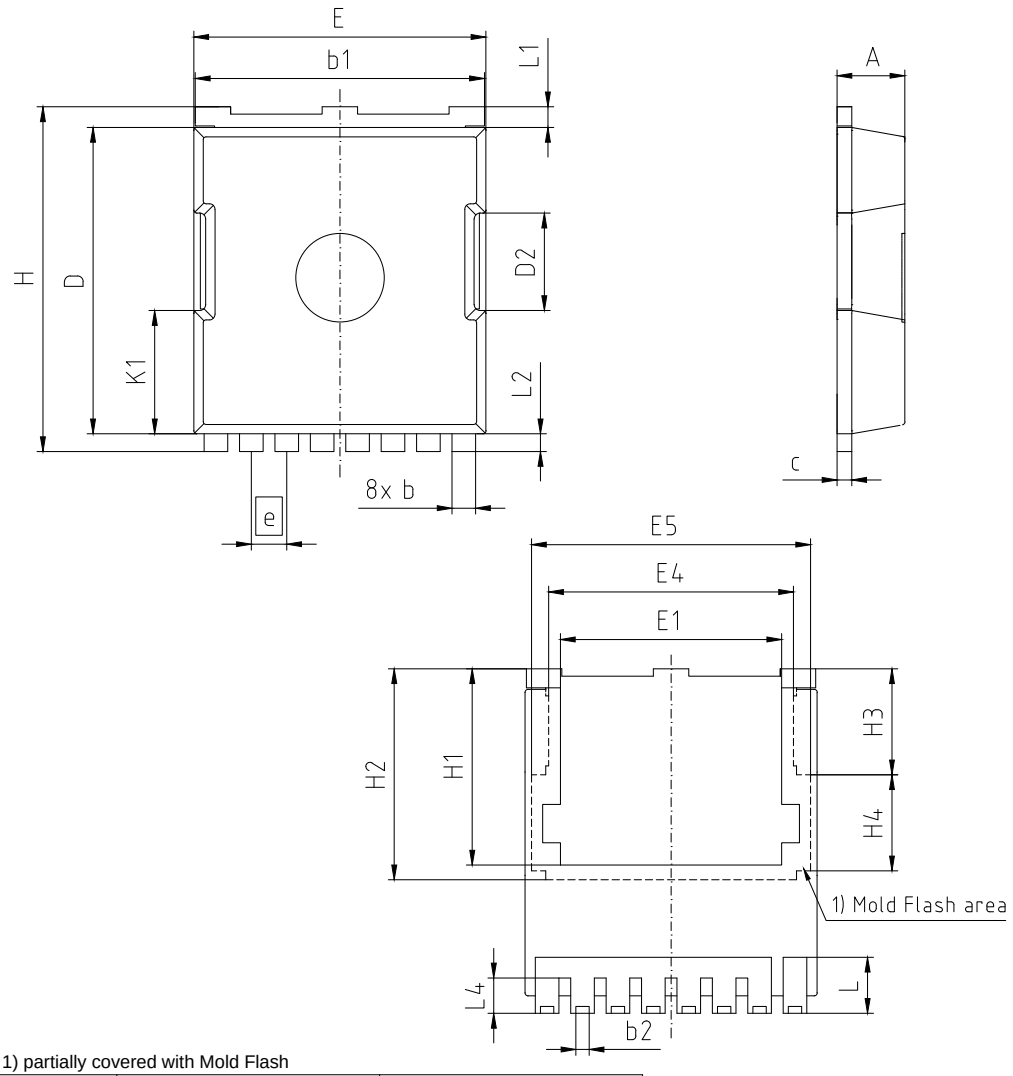


Figure D: Diode Recovery Test Circuit & Waveforms





1) partially covered with Mold Flash

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.40	0.087	0.094
b	0.70	0.90	0.028	0.035
b1	9.70	9.90	0.382	0.390
b2	0.42	0.50	0.017	0.020
c	0.40	0.60	0.016	0.024
D	10.28	10.58	0.405	0.416
D2	3.30		0.130	
E	9.70	10.10	0.382	0.398
E1	7.50		0.295	
E4	8.50		0.335	
E5	9.46		0.372	
e	1.20 (BSC)		0.047 (BSC)	
H	11.48	11.88	0.452	0.468
H1	6.55	6.75	0.258	0.266
H2	7.15		0.281	
H3	3.59		0.141	
H4	3.26		0.128	
N	8		8	
K1	4.18		0.165	
L	1.60	2.10	0.063	0.083
L1	0.70		0.028	
L2	0.60		0.024	
L4	1.00	1.30	0.039	0.051

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