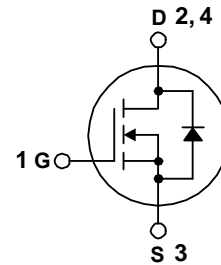
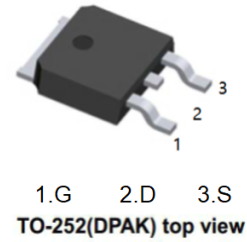


### Features

- $V_{DS} = 60V$
- $I_D = 5.5 A$
- $R_{DS(ON)}$  (at  $V_{GS} = 10V$ )  $< 115m\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = 5V$ )  $< 145m\Omega$
- Low Gate Charge (Typ. 4.8 nC)
- Low Crss (Typ. 17 pF)
- Low Level Gate Drive Requirements Allowing
- Direct Operation form Logic Drivers



### Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted.

Symbol	Parameter	FQD13N06LTM	Unit
$V_{DSS}$	Drain-Source Voltage	60	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ C$ ) - Continuous ( $T_C = 100^\circ C$ )	11	A
		7	A
$I_{DM}$	Drain Current - Pulsed (Note 1)	44	A
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	90	mJ
$I_{AR}$	Avalanche Current (Note 1)	11	A
$E_{AR}$	Repetitive Avalanche Energy (Note 1)	2.8	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	7.0	V/ns
$P_D$	Power Dissipation ( $T_A = 25^\circ C$ ) *	2.5	W
	Power Dissipation ( $T_C = 25^\circ C$ )	28	W
	- Derate above $25^\circ C$	0.22	W/ $^\circ C$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering, 1/8" from Case for Seconds	300	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	FQD13N06LTM	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	2.5	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	110	
	Thermal Resistance, Junction to Ambient (*1 in <sup>2</sup> Pad of 2-oz Copper), Max.	50	

### Electrical Characteristics T<sub>c</sub> = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	60			V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		0.05		V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 48 V, T <sub>C</sub> = 150°C			10	μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 20 V, V <sub>DS</sub> = 0 V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -20 V, V <sub>DS</sub> = 0 V			-100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0		2.5	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 5.5 A		92	115	mΩ
		V <sub>GS</sub> = 5 V, I <sub>D</sub> = 5.5 A		115	145	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 25 V, I <sub>D</sub> = 5.5 A		6		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		270	350	pF
C <sub>oss</sub>	Output Capacitance			95	125	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			17	23	pF
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 30 V, I <sub>D</sub> = 6.8 A, R <sub>G</sub> = 25 Ω  (Note 4)		8	25	ns
t <sub>r</sub>	Turn-On Rise Time			90	190	ns
t <sub>d(off)</sub>	Turn-Off Delay Time			20	50	ns
t <sub>f</sub>	Turn-Off Fall Time			40	90	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 48 V, I <sub>D</sub> = 13.6 A, V <sub>GS</sub> = 5 V  (Note 4)		4.8	6.4	nC
Q <sub>gs</sub>	Gate-Source Charge			1.6		nC
Q <sub>gd</sub>	Gate-Drain Charge			2.7		nC
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current				11	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current				44	
A V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 11 A			1.5	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 13.6 A, dI <sub>F</sub> / dt = 100 A/μs		45		ns
Q <sub>rr</sub>	Reverse Recovery Charge				45	

**Notes:**

1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. L = 870 μH, I<sub>AS</sub> = 11 A, V<sub>DD</sub> = 25 V, R<sub>G</sub> = 25 Ω, starting T<sub>J</sub> = 25°C.
3. I<sub>SD</sub> ≤ 13.6 A, di/dt ≤ 300 A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, starting T<sub>J</sub> = 25°C.
4. Essentially independent of operating temperature.

Typical Characteristics

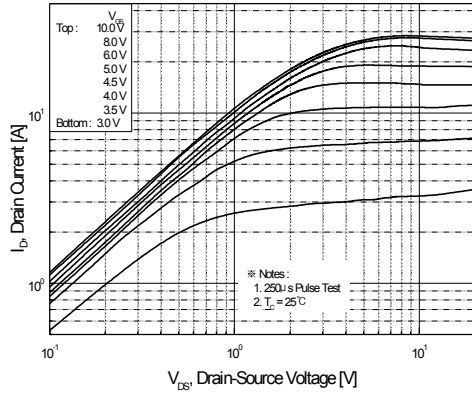


Figure 1. On-Region Characteristics

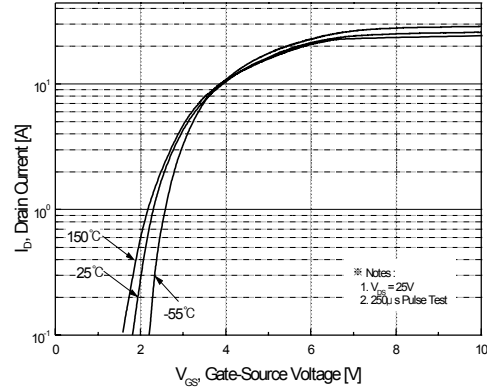


Figure 2. Transfer Characteristics

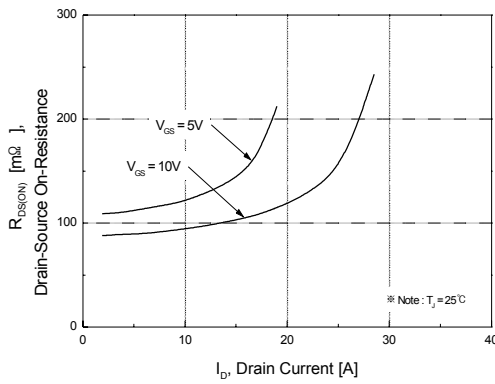


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

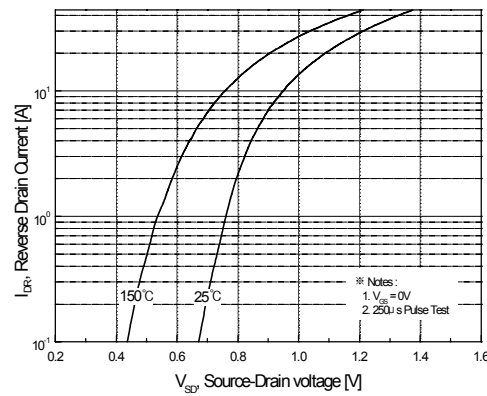


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

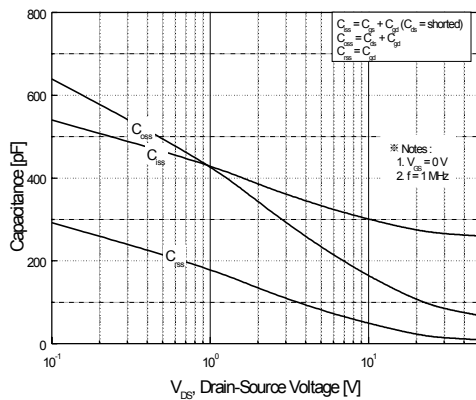


Figure 5. Capacitance Characteristics

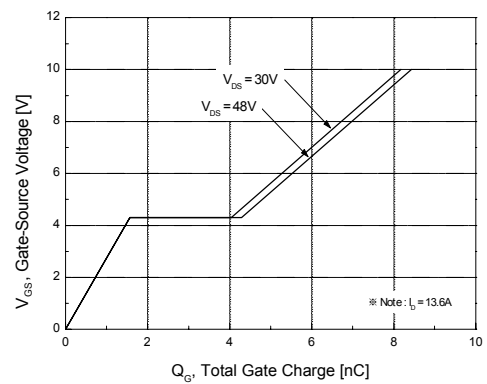


Figure 6. Gate Charge Characteristics

Typical Characteristics

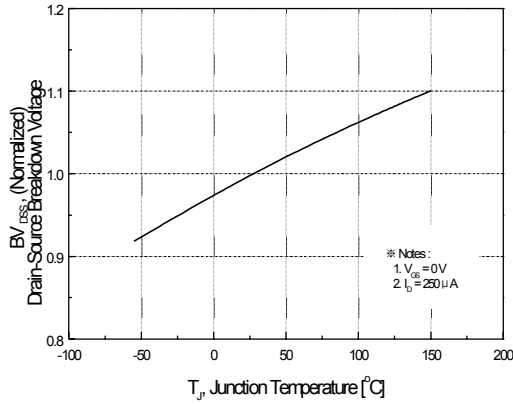


Figure 7. Breakdown Voltage Variation vs. Temperature

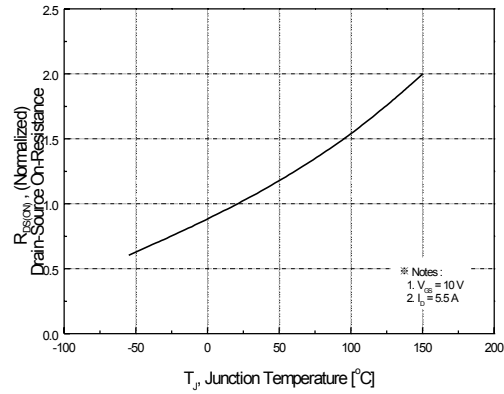


Figure 8. On-Resistance Variation vs. Temperature

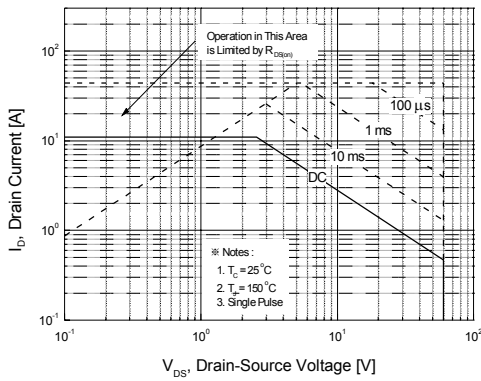


Figure 9. Maximum Safe Operating Area

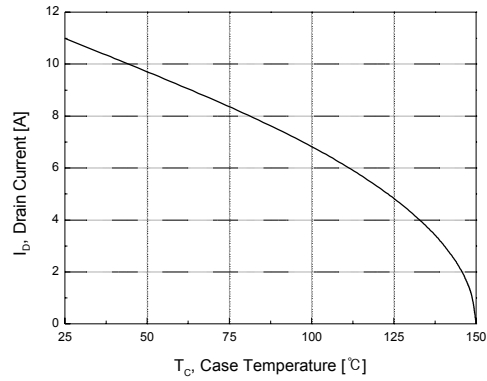


Figure 10. Maximum Drain Current vs. Case Temperature

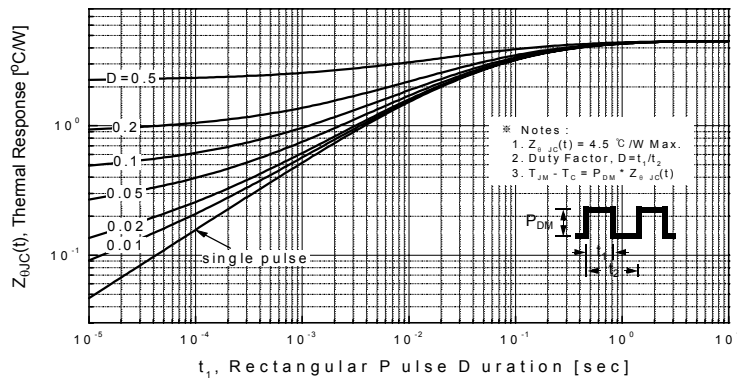


Figure 11. Transient Thermal Response Curve

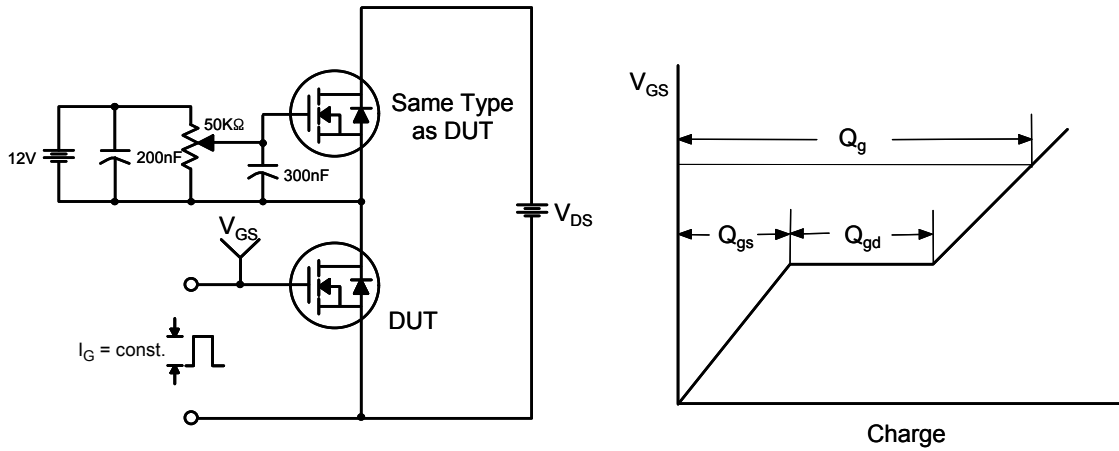


Figure 12. Gate Charge Test Circuit & Waveform

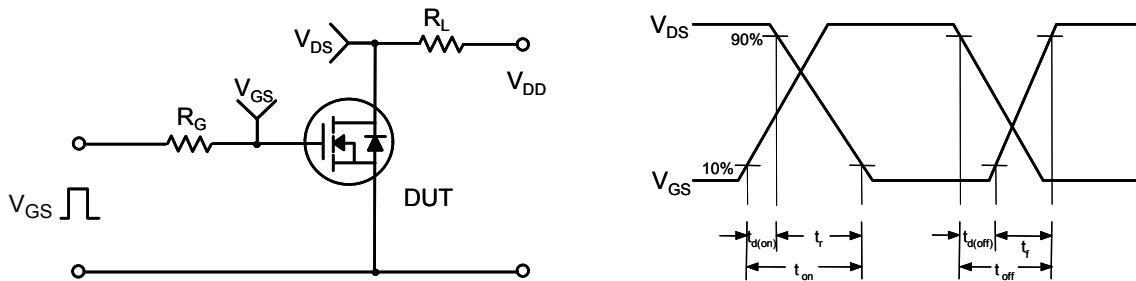


Figure 13. Resistive Switching Test Circuit & Waveforms

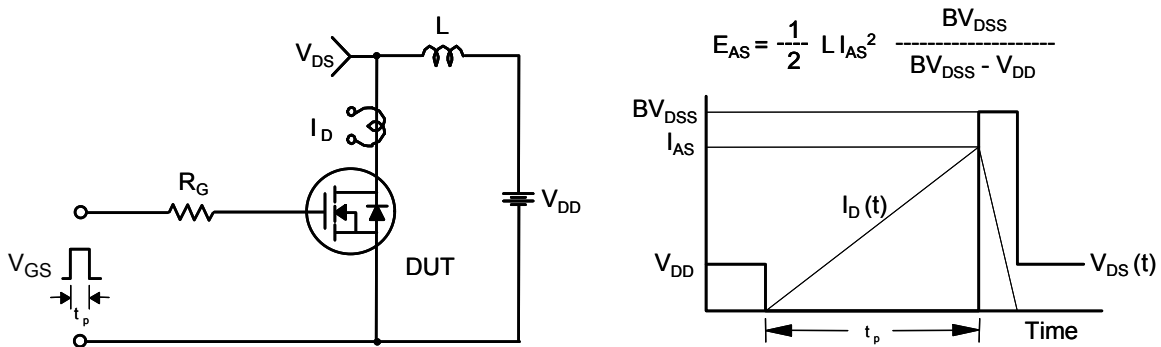
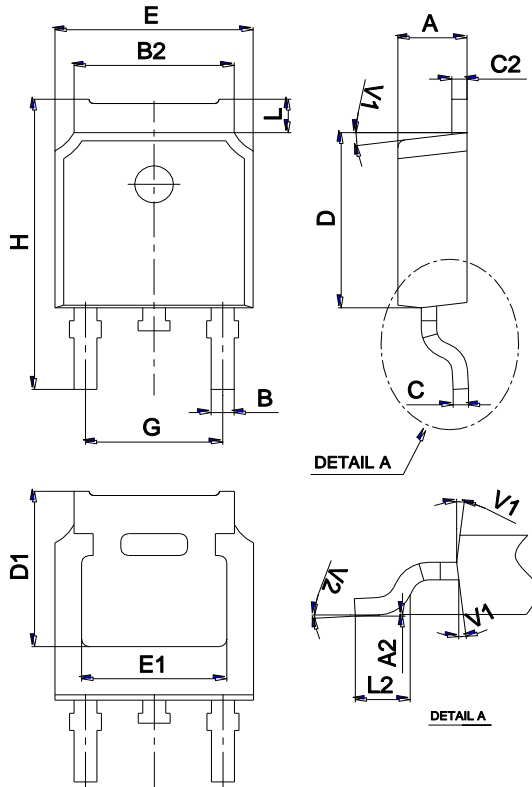


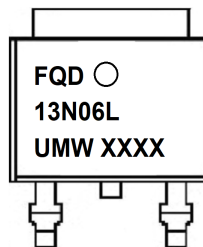
Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FQD13N06LTM	TO-252	2500	Tape and reel