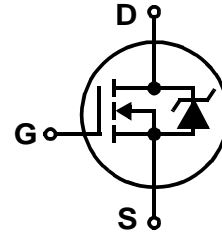


Description

This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

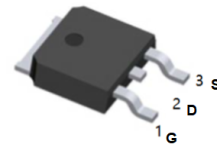


Features

$V_{DS} = 100V$

$I_D = 10A$ ($V_{GS} = 10V$)

$R_{DS(ON)} < 180m\Omega$ ($V_{GS} = 10V$), $I_D = 5.0 A$



TO-252(DPAK) top view

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

Symbol	Parameter	FQD13N10L	Unit
V_{DSS}	Drain-Source Voltage	100	V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$)	10	A
	- Continuous ($T_C = 100^\circ C$)	6.3	A
I_{DM}	Drain Current - Pulsed (Note 1)	40	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	95	mJ
I_{AR}	Avalanche Current (Note 1)	10	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	4.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	6.0	V/ns
P_D	Power Dissipation ($T_A = 25^\circ C$)	2.5	W
	Power Dissipation ($T_C = 25^\circ C$)	40	W
	- Derate above $25^\circ C$	0.32	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 5 Seconds	300	$^\circ C$

Thermal Characteristics

Symbol	Parameter	FQD13N10L	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	3.13	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	110	
	Thermal Resistance, Junction to Ambient (*1 in ² Pad of 2-oz Copper), Max.	50	

Electrical Characteristics
 $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	100	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.09	--	V/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 80\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1.0	--	2.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 5.0\text{ A}$	--	142	180	m Ω
		$V_{GS} = 5\text{ V}, I_D = 5.0\text{ A}$	--	158	200	
g_{FS}	Forward Transconductance	$V_{DS} = 30\text{ V}, I_D = 5.0\text{ A}$	--	8.7	--	S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	400	520	pF
C_{oss}	Output Capacitance		--	95	125	pF
C_{rss}	Reverse Transfer Capacitance		--	20	25	pF
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{ V}, I_D = 12.8\text{ A}, R_G = 25\ \Omega$	--	7.5	25	ns
t_r	Turn-On Rise Time		--	220	450	ns
$t_{d(off)}$	Turn-Off Delay Time		--	22	55	ns
t_f	Turn-Off Fall Time		(Note 4)	--	72	150
Q_g	Total Gate Charge	$V_{DS} = 80\text{ V}, I_D = 12.8\text{ A}, V_{GS} = 5\text{ V}$	--	8.7	12	nC
Q_{gs}	Gate-Source Charge		--	2.0	--	nC
Q_{gd}	Gate-Drain Charge		(Note 4)	--	5.3	--
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	10	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	40	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 12.8\text{ A}, dI_F / dt = 100\text{ A}/\mu\text{s}$	--	75	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.17	--	μC

Notes:

1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. $L = 1.43\text{ mH}, I_{AS} = 10\text{ A}, V_{DD} = 25\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$.
3. $I_{SD} \leq 12.8\text{ A}, di/dt \leq 300\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$.
4. Essentially independent of operating temperature.

Typical Characteristics

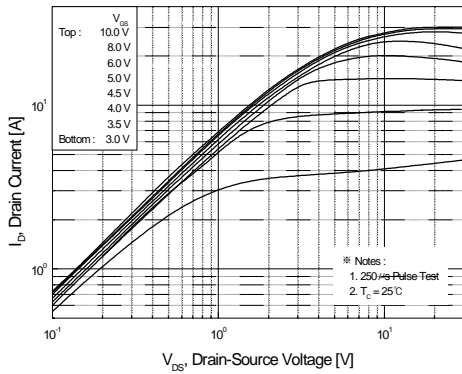


Figure 1. On-Region Characteristics

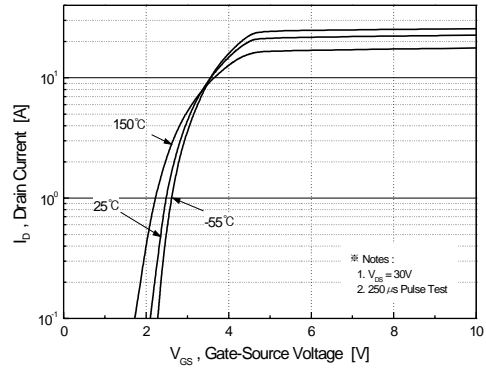


Figure 2. Transfer Characteristics

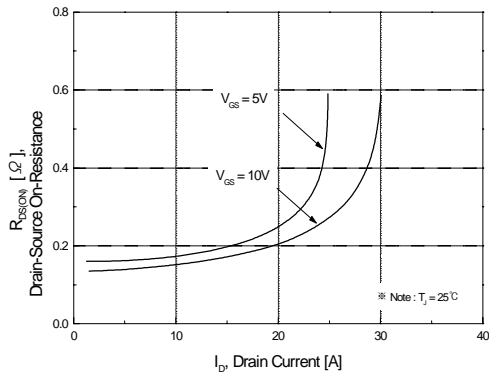


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

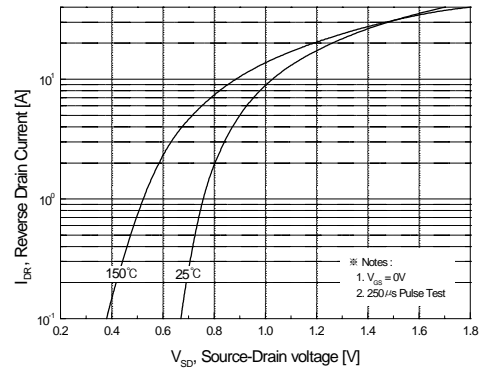


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

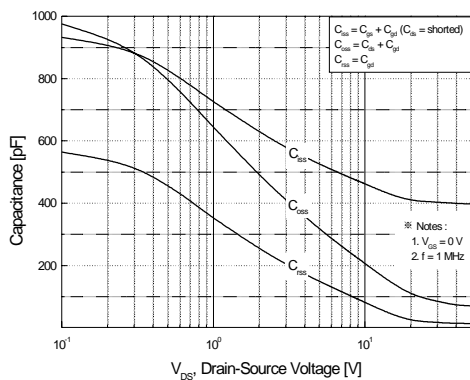


Figure 5. Capacitance Characteristics

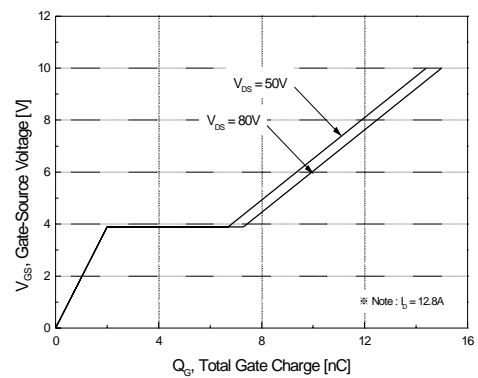


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

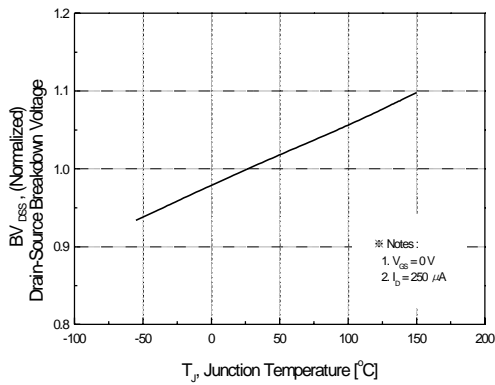


Figure 7. Breakdown Voltage Variation vs. Temperature

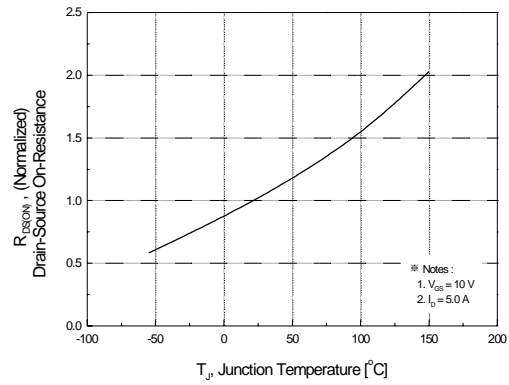


Figure 8. On-Resistance Variation vs. Temperature

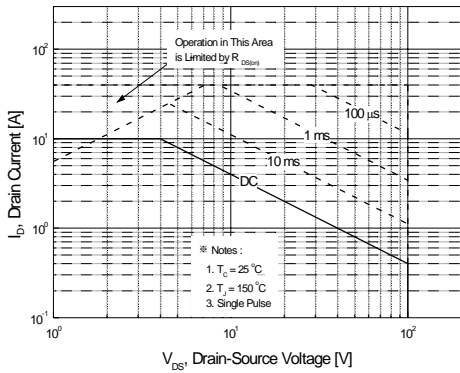


Figure 9. Maximum Safe Operating Area

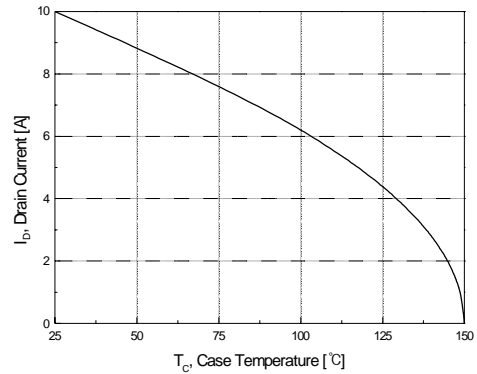


Figure 10. Maximum Drain Current vs. Case Temperature

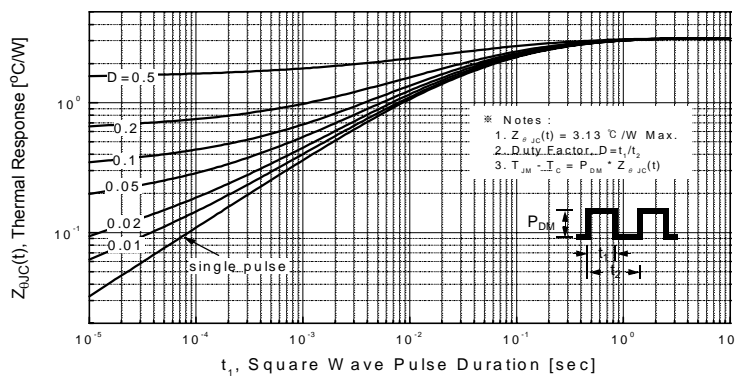


Figure 11. Transient Thermal Response Curve

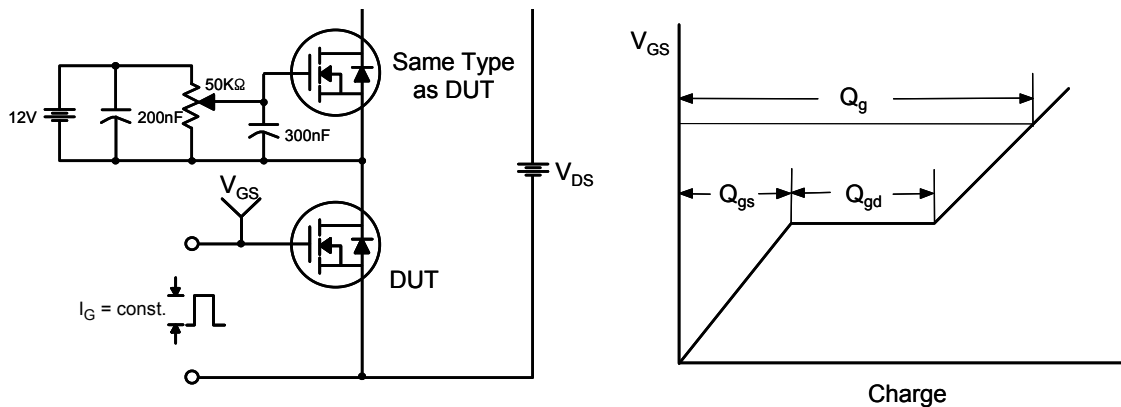


Figure 12. Gate Charge Test Circuit & Waveform

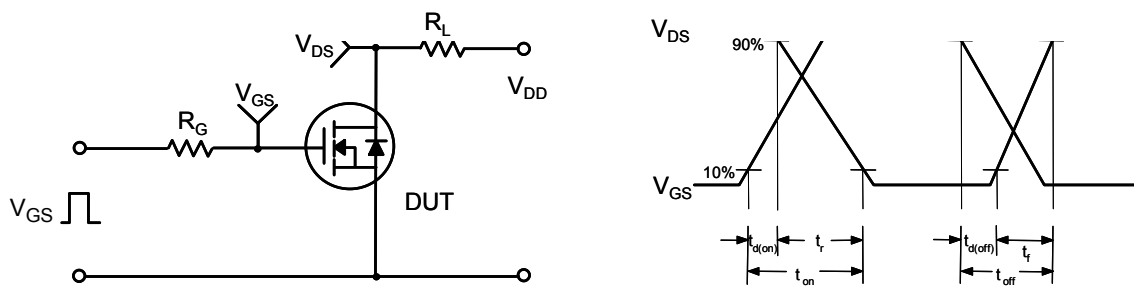


Figure 13. Resistive Switching Test Circuit & Waveforms

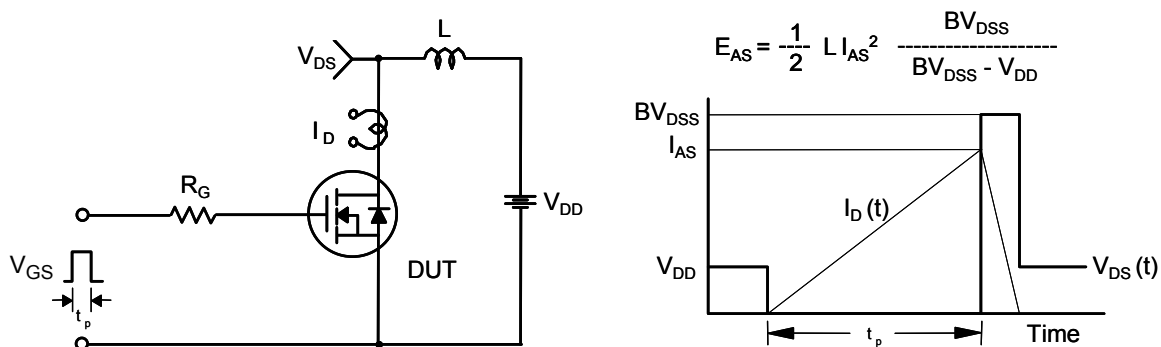


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

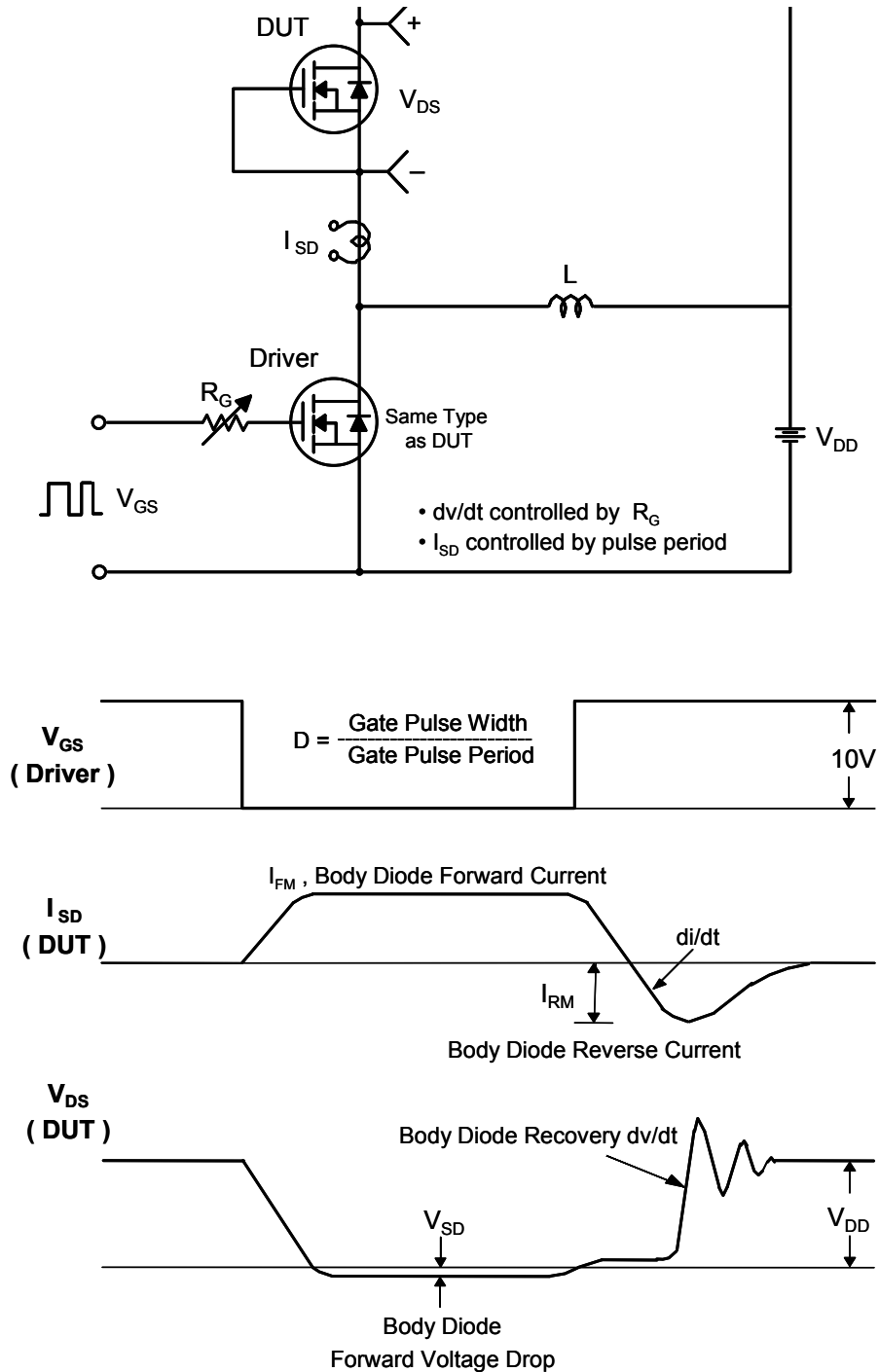
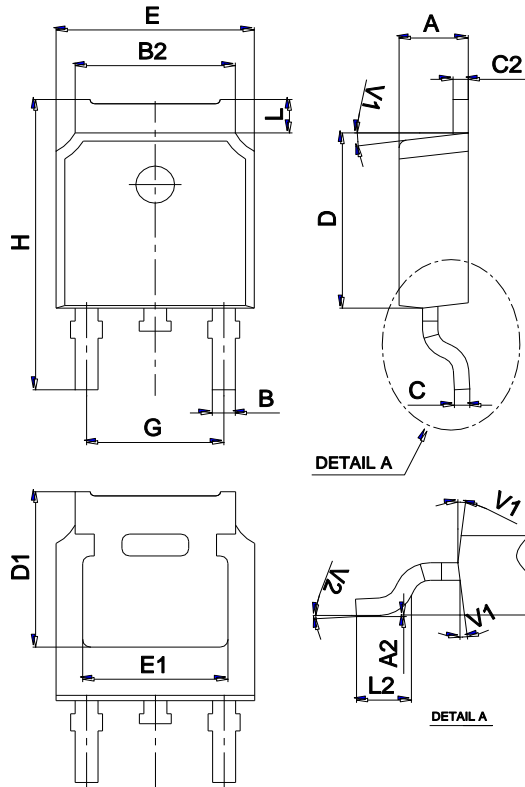


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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°

Ordering information

Order code	Package	Baseqty	Delivery mode
FQD13N10LTM	TO-252	2500	Tape and reel