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November 2013

### FQD16N25C

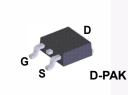
# N-Channel QFET<sup>®</sup> MOSFET 250 V, 16 A, 270 m $\Omega$

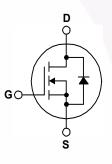
#### Features

- 16 A, 250 V,  $R_{DS(on)}$  = 270 m $\Omega$  (Max.) @ V<sub>GS</sub> = 10 V, I<sub>D</sub> = 8 A
- Low Gate Charge (Typ. 41 nC)
- Low Crss (Typ. 68 pF)
- 100% Avalanche Tested

#### Description

This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. 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, active power factor correction (PFC), and electronic lamp ballasts.





### Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted.

Symbol	Parameter		FQD16N25CTM	Unit
V <sub>DSS</sub>	Drain-Source Voltage		250	V
	Drain Current - Continuous ( $T_C = 25^{\circ}C$ )		16	А
ID	- Continuous (T <sub>C</sub> = 100°C)		10.1	А
I <sub>DM</sub>	Drain Current - Pulsed	(Note 1)	64	A
V <sub>GSS</sub>	Gate-Source Voltage		± 30	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)		432	mJ
I <sub>AR</sub>	Avalanche Current	(Note 1)	16	А
E <sub>AR</sub>	Repetitive Avalanche Energy (Note 1		160	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		5.5	V/ns
P <sub>D</sub>	Power Dissipation ( $T_C = 25^{\circ}C$ )		160	W
' D	- Derate above 25°C		1.28	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range		-55 to +150	°C
т.	Maximum lead temperature for soldering purposes,		300	°C
ΤL	1/8" from case for 5 seconds		330	C

#### **Thermal Characteristics**

Symbol	Parameter	FQD16N25CTM	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max. 0.78		°C/W
$R_{ extsf{ heta}JA}$	Thermal Resistance, Junction-to-Ambient, Max.	110	0/10

Device Marking Device		Package	Reel Size	Таре	Width	Quantity		
FQD16N25C FQD16N25CTM		D-PAK	330 mm	16 mm		2500 units		
Electri	cal Chai	racteristics T <sub>C</sub> = 25°C	C unless otherwise	noted.				
Symbol		Parameter	Test C	Conditions	Min	Тур	Max	Unit
Off Cha	aracteristi	cs						
BV <sub>DSS</sub>	Drain-Sou	rce Breakdown Voltage	$V_{GS} = 0 V, I_{D} = 2$	250 μA	250			V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdowi Coefficient	n Voltage Temperature	I <sub>D</sub> = 250 μA, Ref	erenced to 25°C		0.31		V/°C
			V <sub>DS</sub> = 250 V, V <sub>G</sub>	s = 0 V			10	μA
IDSS	Zero Gate	Voltage Drain Current	V <sub>DS</sub> = 200 V, T <sub>C</sub>	= 125°C			100	μA
I <sub>GSSF</sub>	Gate-Body	Leakage Current, Forward	$V_{GS}$ = 30 V, $V_{DS}$	= 0 V			100	nA
I <sub>GSSR</sub>	Gate-Body	Leakage Current, Reverse	$V_{GS}$ = -30 V, $V_{DS}$	<sub>S</sub> = 0 V			-100	nA
On Cha	aracteristi	cs						
V <sub>GS(th)</sub>	Gate Three	shold Voltage	$V_{DS} = V_{GS}, I_D =$	250 μΑ	2.0		4.0	V
R <sub>DS(on)</sub>	Static Drai On-Resista		V <sub>GS</sub> = 10 V, I <sub>D</sub> =	8A		0.22	0.27	Ω
9 <sub>FS</sub>	Forward T	ransconductance	V <sub>DS</sub> = 40 V, I <sub>D</sub> =	8 A		10.5		S
Dynam	ic Charac	teristics						
C <sub>iss</sub>	Input Capa	acitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub>	= 0 V,		830	1080	pF
C <sub>oss</sub>	Output Ca	pacitance	f = 1.0 MHz			170	220	pF
C <sub>rss</sub>	Reverse T	ransfer Capacitance				68	89	pF
Switch	ing Chara	cteristics						
t <sub>d(on)</sub>	Turn-On D		V <sub>DD</sub> = 125 V, I <sub>D</sub> = 16A,			15	40	ns
t <sub>r</sub>	Turn-On R	ise Time	$R_G = 25 \Omega$			130	270	ns
t <sub>d(off)</sub>	Turn-Off D	elay Time	- Ŭ			135	280	ns
t <sub>f</sub>	Turn-Off F	all Time		(Note 4)		105	220	ns
Qg	Total Gate	Charge	V <sub>DS</sub> = 200 V, I <sub>D</sub> = 16 A, V <sub>GS</sub> = 10 V			41	53.5	nC
Q <sub>gs</sub>	Gate-Sour	ce Charge				5.6		nC
Q <sub>gd</sub>	Gate-Drair	n Charge	]	(Note 4)		22.7		nC
	Source Die	ode Characteristics a	nd Maximum I	Ratings				
I <sub>S</sub>		Continuous Drain-Source Did		-			16	Α
I <sub>SM</sub>		Pulsed Drain-Source Diode F		-			64	A
V <sub>SD</sub>		rce Diode Forward Voltage	$V_{GS} = 0 V, I_{S} = 1$	6 A			1.5	V

۱ <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		 	16	А
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode F	Forward Current	 	64	А
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 16 A	 	1.5	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 16 A,	 260		ns
Q <sub>rr</sub>	Reverse Recovery Charge	dI <sub>F</sub> / dt = 100 A/µs	 2.47	-	μC

NOTES:

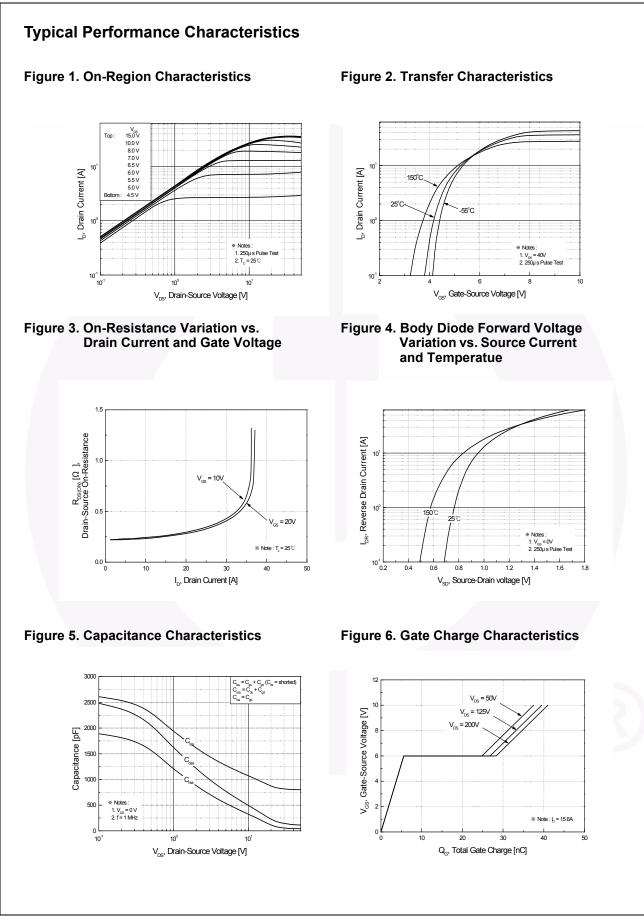
1. Repetitive Rating : Pulse width limited by maximum junction temperature.

2. L = 2.7 mH, I\_{AS} = 16 A, V\_{DD} = 50 V, R\_G = 25  $\Omega,$  starting  $~T_J$  = 25°C.

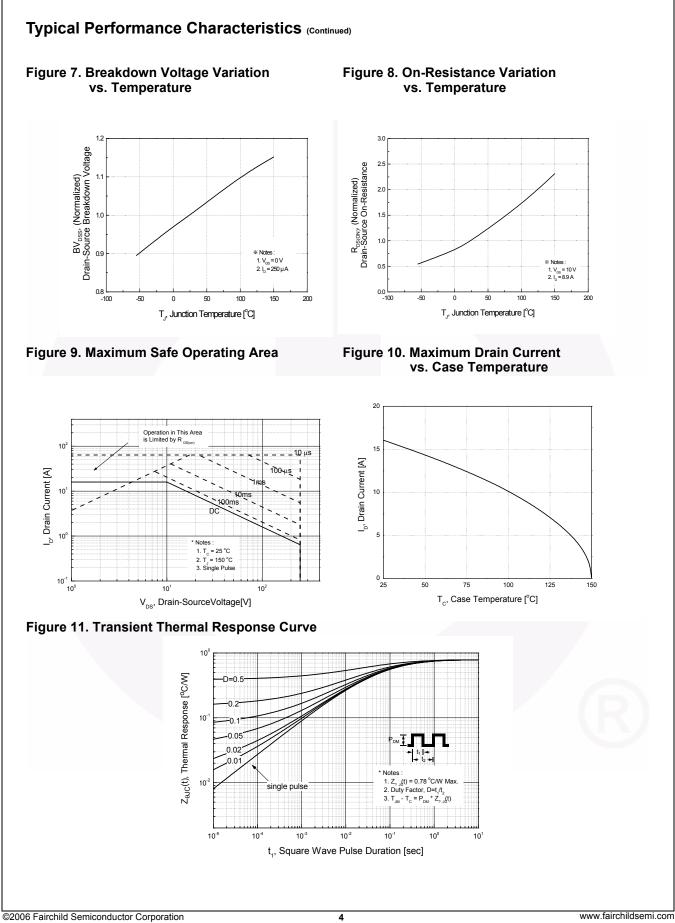
3. I\_{SD} \leq 16 A, di/dt  $\leq$  300 A/µs, V\_{DD}  $\leq$  BV\_{DSS,} starting ~T\_J = 25°C.

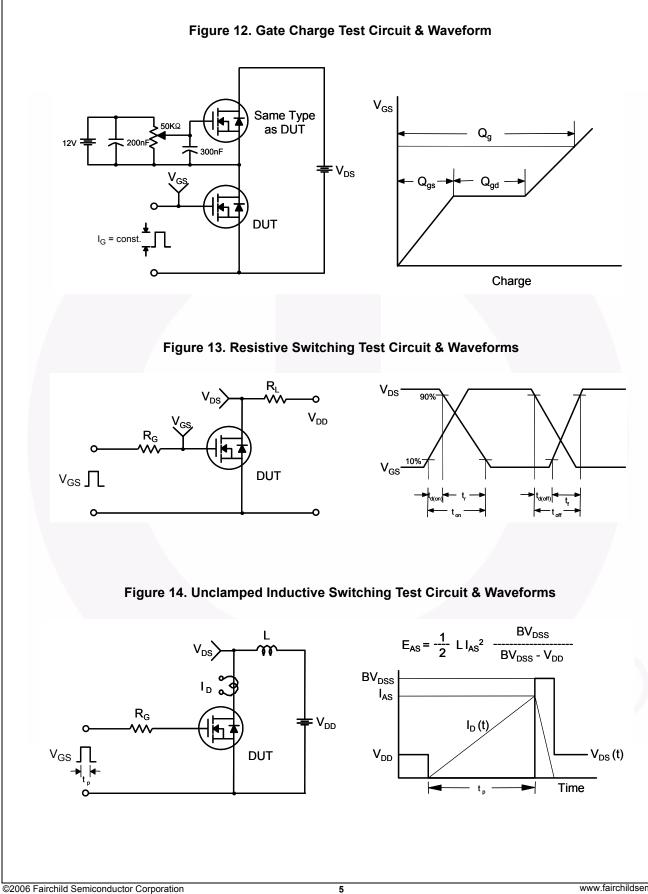
4. Essentially independent of operating temperature.

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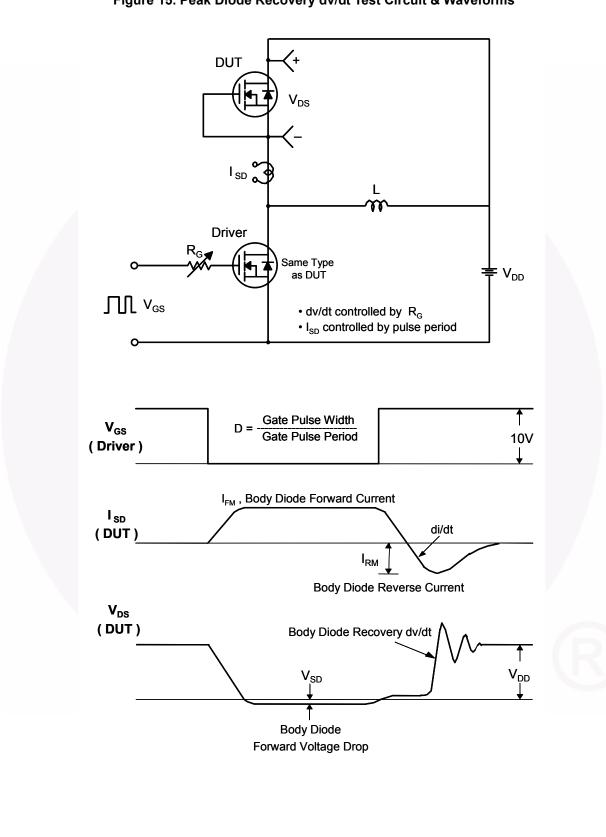
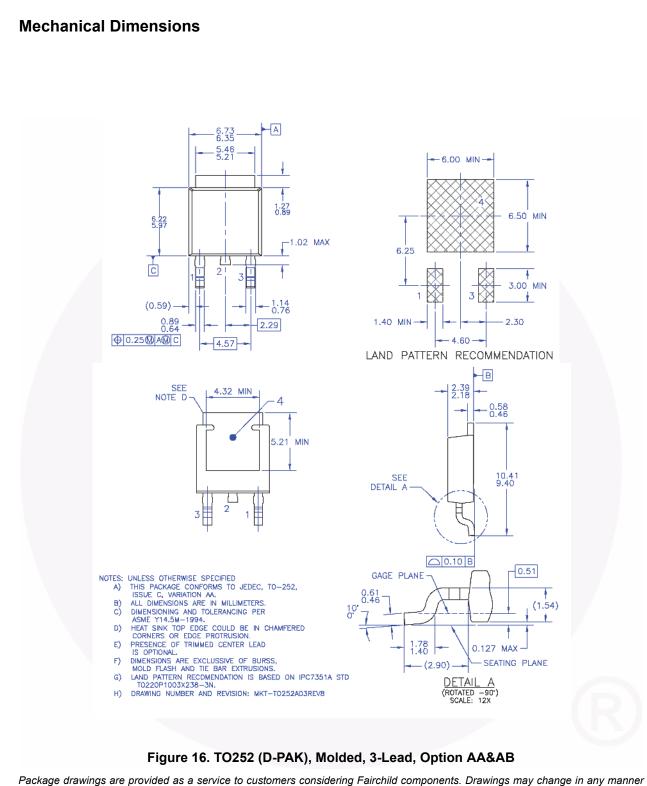


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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