Features

- 0.2 A, 600 V, $R_{DS(on)}$=9.3 Ω(

D

S

G **SOT-223**

D

G

S
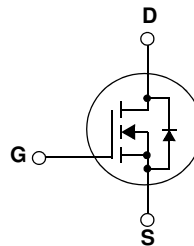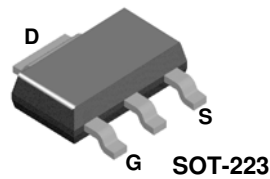
MOSFET Maximum Ratings T_C = 25°C unless otherwise noted*

Symbol	Parameter			FQT1N60C	Unit
V_{DSS}	Drain to Source Voltage			600	V
V_{GSS}	Gate to Source Voltage			±30	V
I_D	Drain Current	-Continuous (T_C = 25°C)		0.2	A
		-Continuous (T_C = 100°C)		0.12	
I_{DM}	Drain Current	- Pulsed	(Note 1)	0.8	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	33	mJ
I_{AR}	Avalanche Current		(Note 1)	0.2	A
E_{AR}	Repetitive Avalanche Energy		(Note 1)	0.2	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	4.5	V/ns
P_D	Power Dissipation	(T_A = 25°C)		2.1	W
		- Derate above 25°C		0.02	W/^{o}C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +150	^{o}C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds			300	^{o}C

Thermal Characteristics

Symbol	Parameter	Min.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient*	-	60	^{o}C/W

* When mounted on the minimum pad size recommended (PCB Mount)

Package Marking and Ordering Information T_C = 25°C unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQT1N60C	FQT1N60C	SOT-223	330mm	12mm	4000

Electrical Characteristics

| Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, T_J = 25°C	600	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.6	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	-	-	25	μA
		V_{DS} = 480V, T_C = 125°C	-	-	250	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±30V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 0.1A	-	9.3	11.5	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40V, I_D = 0.1A (Note 4)	-	0.75	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V f = 1MHz	-	130	170	pF
C_{oss}	Output Capacitance		-	19	25	pF
C_{rss}	Reverse Transfer Capacitance		-	3.5	6	pF
Q_g	Total Gate Charge at 10V	V_{DS} = 480V, I_D = 1A V_{GS} = 10V	-	4.8	6.2	nC
Q_{gs}	Gate to Source Gate Charge		-	0.7	-	nC
Q_{gd}	Gate to Drain "Miller" Charge	(Note 4, 5)	-	2.7	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300V, I_D = 1A R_G = 25Ω	-	7	24	ns
t_r	Turn-On Rise Time		-	21	52	ns
$t_{d(off)}$	Turn-Off Delay Time		-	13	36	ns
t_f	Turn-Off Fall Time	(Note 4, 5)	-	27	64	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	0.2	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	0.8	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 0.2A	-	-	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 1A	-	190	-	ns
Q_{rr}	Reverse Recovery Charge	dI_F/dt = 100A/μs (Note 4)	-	0.53	-	μC

Notes:

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

2. L = 59mH, I_{AS} = 1.1A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

3. $I_{SD} \leq$ 0.2A, di/dt $\leq$ 200A/μs, $V_{DD} \leq BV_{DSS}$, Starting T_J = 25°C

4. Pulse Test: Pulse width $\leq$ 300μs, Duty Cycle $\leq$ 2%

5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

V_{GS}
Top: 15.0 V
       10.0 V
       8.0 V
       7.0 V
       6.5 V
       6.0 V
       5.5 V
       5.0 V
Bottom: 4.5 V

Notes :
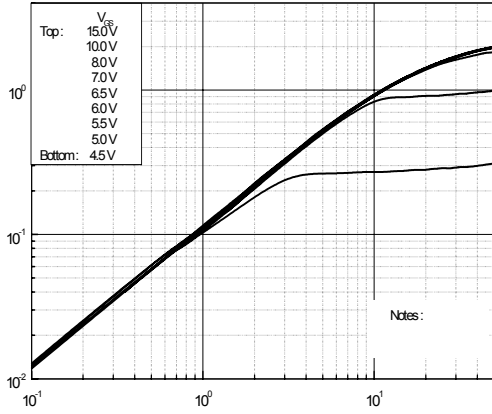
Figure 2. Transfer Characteristics

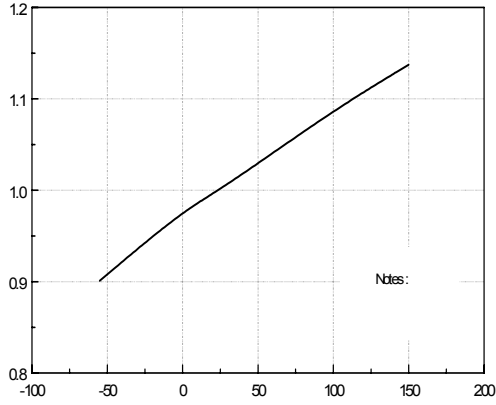**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**

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

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

Notes :

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

Gate Charge Test Circuit & Waveform
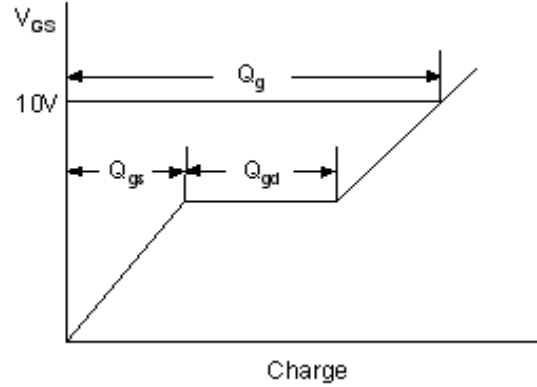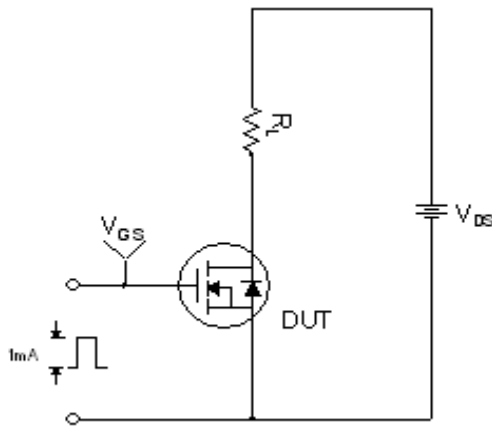
Resistive Switching Test Circuit & Waveforms
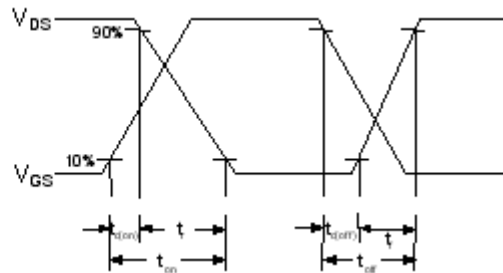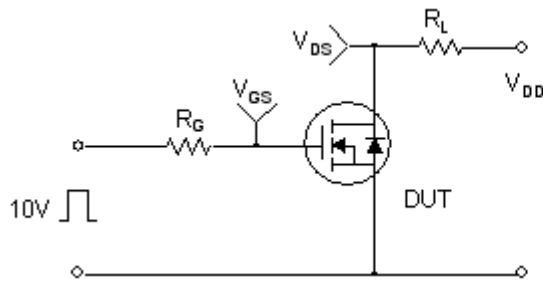
Unclamped Inductive Switching Test Circuit & Waveforms

$$E_{AS} = \frac{1}{2} L I_{AS}^2$$
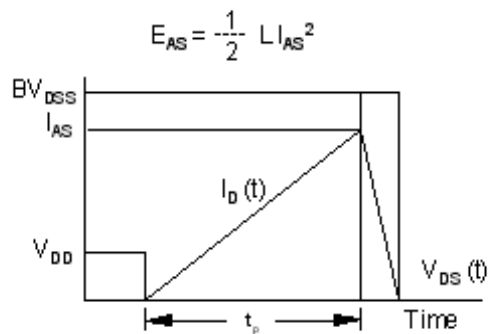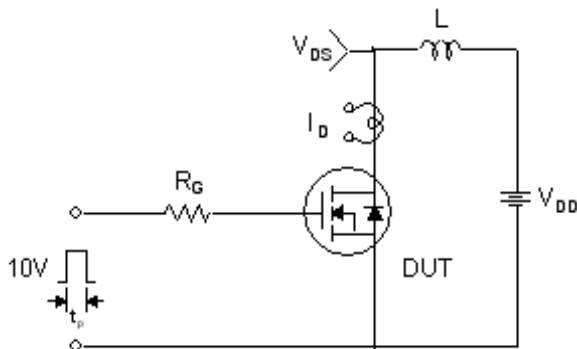
Peak Diode Recovery dv/dt Test Circuit & Waveforms

DUT

V_{DS}

I_{SD}

L

Driver

R_G

Same Type
as DUT

V_{GS}

V_{DD}

• dv/dt controlled by R_G
• I_{SD} controlled by pulse period

V_{GS}
(Driver)

$D = \dfrac{\text{Gate Pulse Width}}{\text{Gate Pulse Period}}$

10V

I_{SD}
(DUT)

I_{FM}, Body Diode Forward Current

di/dt

I_{RM}

Body Diode Reverse Current

V_{DS}
(DUT)

Body Diode Recovery dv/dt

V_{SD}

V_{DD}

Body Diode
Forward Voltage Drop
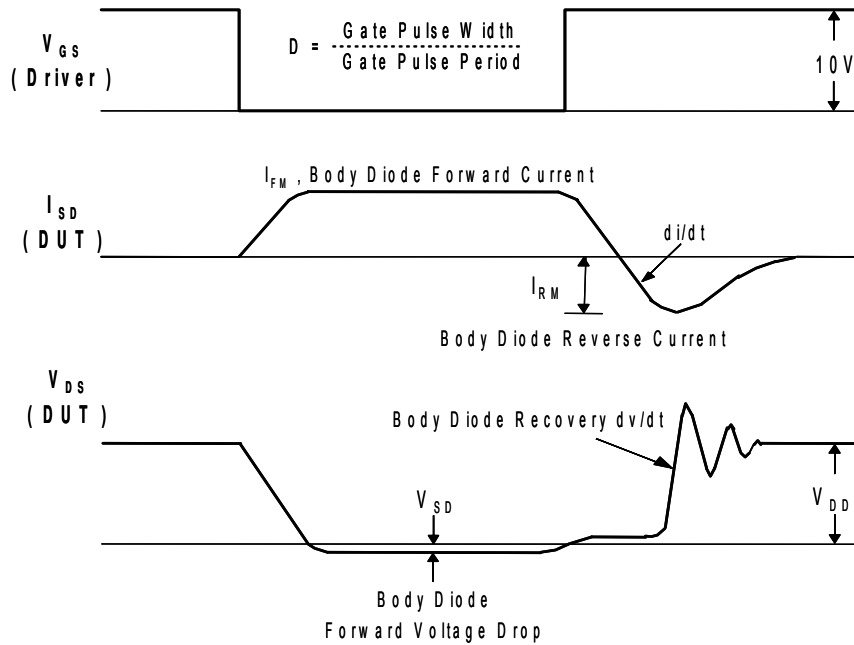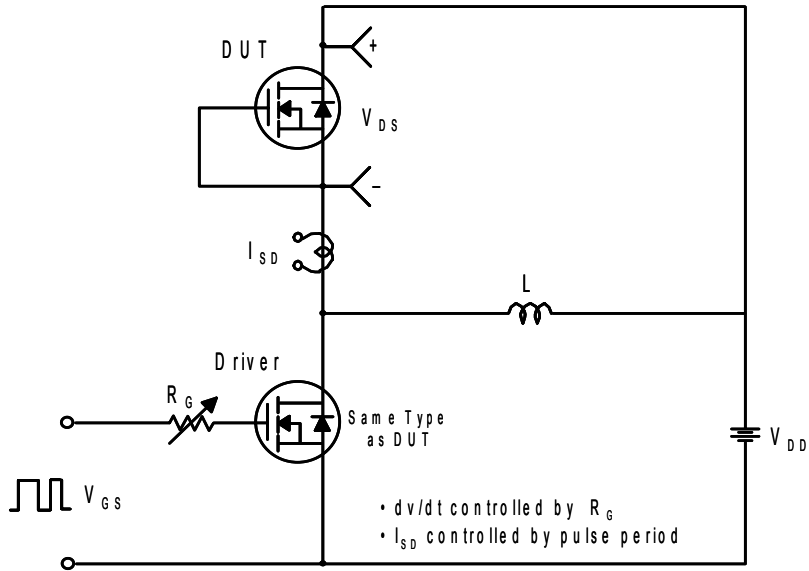
Mechanical Dimensions

SOT-223

3.00 ±0.10

2.30 TYP

0.70 ±0.10

(0.95)

4.60 ±0.25

(0.95)

MAX1.80

0.08MAX

0.65 ±0.20

1.75 ±0.20

3.50 ±0.20

(0.60)

(0.60)

0.06 +0.04 −0.02

7.00 ±0.30

0.25 +0.10 −0.05

0°~10°

1.60 ±0.20

(0.46)

(0.89)

6.50 ±0.20

PUBLICATION ORDERING INFORMATION
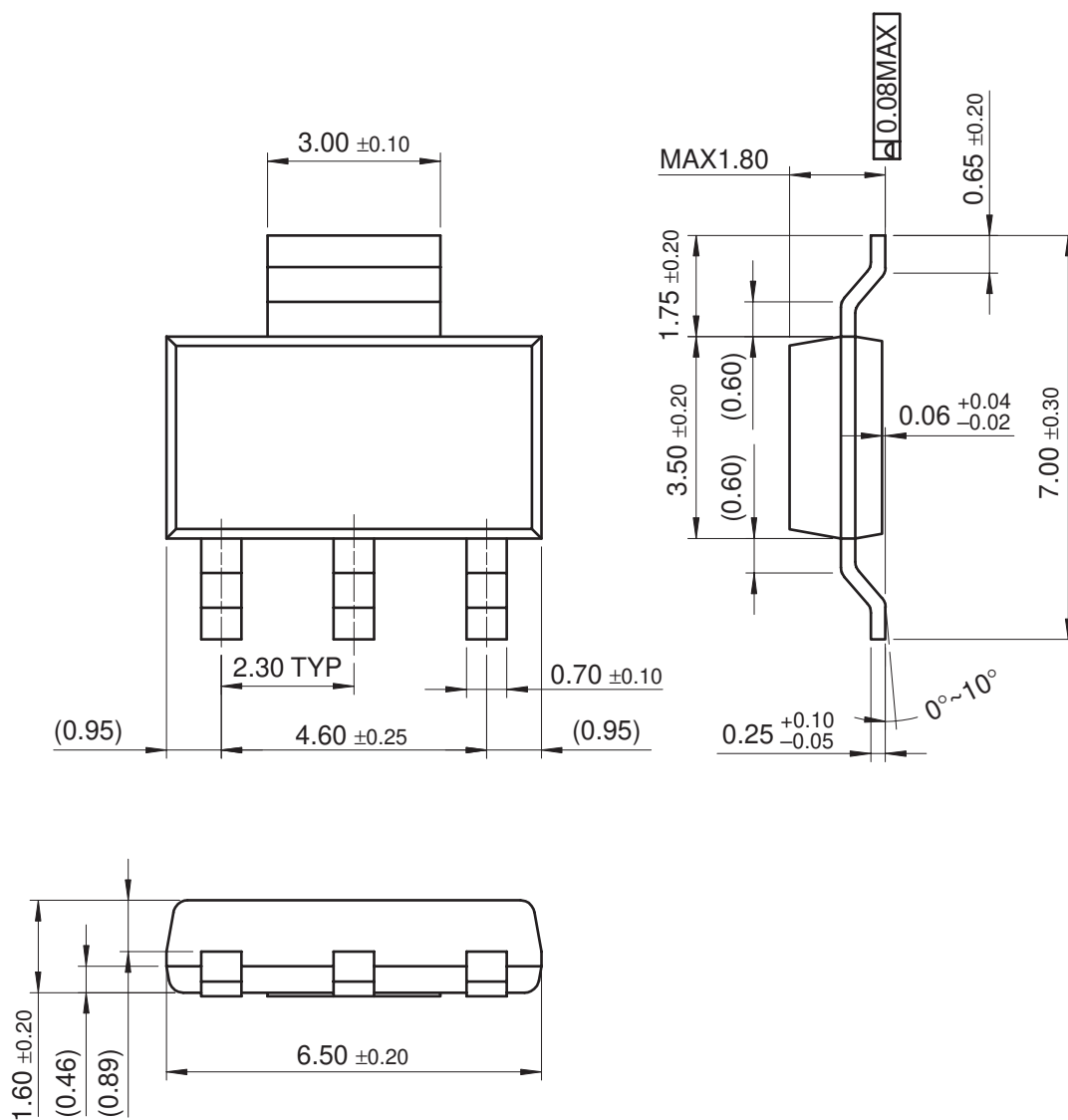
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