

# **MOSFET** - N-Channel, QFET

**800 V, 0.2 A, 20**  $\Omega$ 

# FQT1N80TF-WS

#### Description

This N-Channel enhancement mode power MOSFET is produced using **onsemi**'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.

#### **Features**

- 0.2 A, 800 V,  $R_{DS(on)}$ =15.5  $\Omega$  (Typ.) @  $V_{GS}$  = 10 V,  $I_D$  = 0.1 A
- Low Gate Charge (Typ. 5.5 nC)
- Low C<sub>rss</sub> (Typ. 2.7 pF)
- 100% Avalanche Tested
- RoHS Compliant

## **MAXIMUM RATINGS** ( $T_C = 25 \, ^{\circ}C$ unless otherwise noted\*)

Symbol		Value	Unit	
V <sub>DSS</sub>	Drain to Source	800	V	
V <sub>GSS</sub>	Gate to Source	Voltage	±30	V
I <sub>D</sub>	Drain Current	Drain Current - Continuous (T <sub>C</sub> = 25 °C)		Α
		- Continuous (T <sub>C</sub> = 100 °C)	0.12	
I <sub>DM</sub>	Drain Current	- Pulsed (Note 1)	0.8	Α
E <sub>AS</sub>	Single Pulsed A	90	mJ	
I <sub>AR</sub>	Avalanche Curre	0.2	Α	
E <sub>AR</sub>	Repetitive Avala	0.2	mJ	
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.0	V/ns
P <sub>D</sub>	Power	(T <sub>C</sub> = 25 °C)	2.1	W
	Dissipation	– Derate above 25 °C	0.02	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and S	-55 to +150	°C	
TL	Maximum Lead Purpose, 1/8" from	300	°C	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 1. Repetitive Rating: Pulse width limited by maximum junction temperature
- 2. L = 170 mH,  $I_{AS}$  = 1 A,  $V_{DD}$  = 50 V,  $R_{G}$  = 25  $\Omega$ , Starting  $T_{J}$  = 25  $^{\circ}C$
- 3.  $I_{SD} \le 1$  A, di/dt  $\le 200$  A/ $\mu$ s,  $V_{DD} \le BV_{DSS}$ , Starting  $T_J = 25$  °C

#### THERMAL CHARACTERISTICS

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient*	60	°C/W

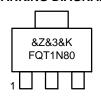
When mounted on the minimum pad size recommended (PCB Mount)

V <sub>DSS</sub>	R <sub>DS(on)</sub> MAX	I <sub>D</sub> MAX
800 V	20 Ω @ 10 V	0.2 A



SOT-223 CASE 318H

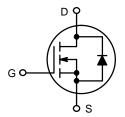
#### MARKING DIAGRAM



&Z = Assembly Plant Code &3 = 3-Digit Date Code

&S = 3-Digit Date Code &K = 2-Digits Lot Run Traceability Code

FQT1N180 = Specific Device Code



**N-Channel MOSFET** 

### **ORDERING INFORMATION**

See detailed ordering and shipping information on page 7 of this data sheet.

## **ELECTRICAL CHARACTERISTICS** (T<sub>J</sub> = 25 °C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Тур	Max	Unit
OFF CHAR	ACTERISTICS					
BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V, T_J = 25 ^{\circ}C$	800	_	-	V
$\Delta BV_{DSS} / \Delta T_{J}$	Breakdown Voltage Temperature Coefficient	$I_D$ = 250 $\mu$ A, Referenced to 25 °C	-	0.8	-	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 800 V, V <sub>GS</sub> = 0 V	-	_	25	μΑ
		V <sub>DS</sub> = 640 V, T <sub>C</sub> = 125 °C	-	_	250	1
I <sub>GSS</sub>	Gate to Body Leakage Current	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$	-	_	±100	nA
ON CHARA	CTERISTICS					-
V <sub>GS(th)</sub>	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	3.0	_	5.0	V
R <sub>DS(on)</sub>	Static Drain to Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.1 A	-	15.5	20	Ω
9FS	Forward Transconductance	$V_{DS} = 40 \text{ V}, I_{D} = 0.1 \text{ A (Note 4)}$	-	0.75	-	S
DYNAMIC (	CHARACTERISTICS					-
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz	-	150	195	pF
C <sub>oss</sub>	Output Capacitance	1	-	20	30	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	2.7	5.0	pF
Qg	Total Gate Charge at 10 V	V <sub>DS</sub> = 640 V, I <sub>D</sub> = 1 A, V <sub>GS</sub> = 10 V	_	5.5	7.2	nC
Q <sub>gs</sub>	Gate to Source Gate Charge	(Note 4, 5)	_	1.1	-	nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge	7	-	3.3	-	nC
SWITCHING	G CHARACTERISTICS	•				
t <sub>d(on)</sub>	Turn-On Delay Time	$V_{DD} = 400 \text{ V}, I_D = 1 \text{ A}, R_G = 25 \Omega$	-	10	30	ns
t <sub>r</sub>	Turn-On Rise Time	(Note 4, 5)	-	25	60	ns
t <sub>d(off)</sub>	Turn-Off Delay Time	7	-	15	40	ns
t <sub>f</sub>	Turn-Off Fall Time		-	25	60	ns
DRAIN-SO	JRCE DIODE CHARACTERISTICS					•
Is	Maximum Continuous Drain to Source Diode F	Forward Current	-	_	0.2	Α
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	_	0.8	Α
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{SD} = 0.2 \text{ A}$	-	_	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	$V_{GS} = 0 \text{ V}, I_{SD} = 1 \text{ A},$	-	300	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	$dI_F/dt = 100 \text{ A/}\mu\text{s} \text{ (Note 4)}$	_	0.6	-	μС

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Pulse Test: Pulse width  $\leq 300~\mu s$ , Duty Cycle  $\leq 2\%$ 5. Essentially Independent of Operating Temperature Typical Characteristics

#### TYPICAL PERFORMANCE CHARACTERISTICS

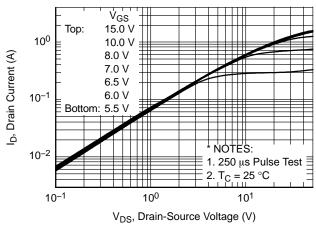


Figure 1. On-Region Characteristics

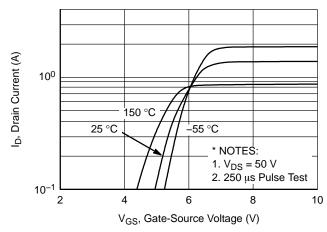


Figure 2. Transfer Characteristics

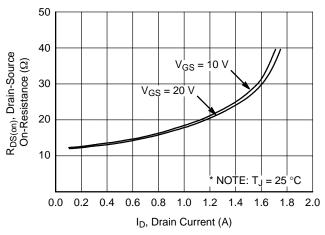


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

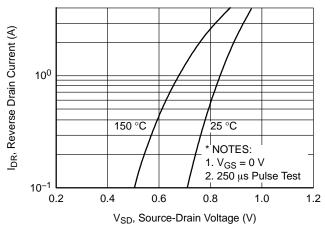


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

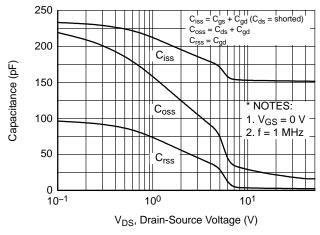


Figure 5. Capacitance Characteristics

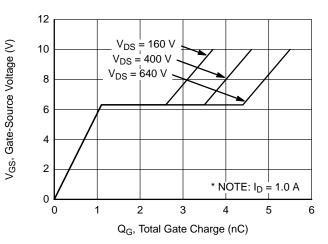


Figure 6. Gate Charge Characteristics

### TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

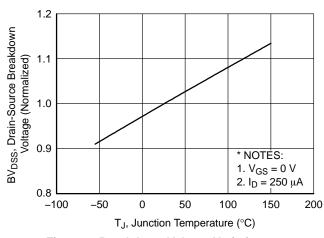


Figure 7. Breakdown Voltage Variation vs. Temperature

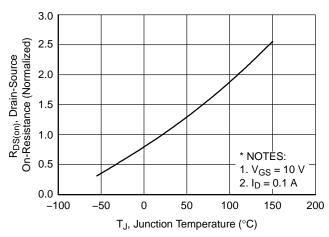


Figure 8. On-Resistance Variation vs. Temperature

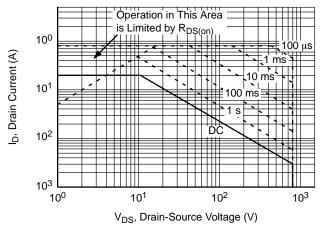


Figure 9. Maximum Safe Operating Area

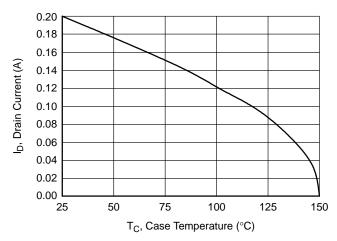
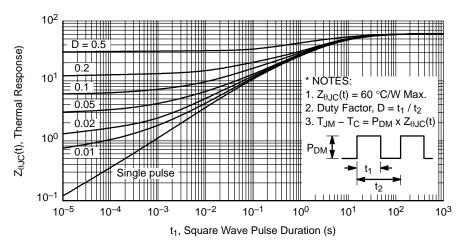


Figure 10. Maximum Drain Current vs.

Case Temperature



**Figure 11. Transient Thermal Response Curve** 

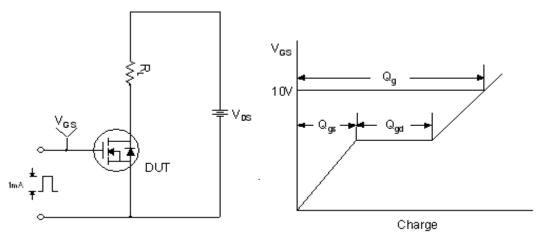


Figure 12. Gate Charge Test Circuit & Waveform

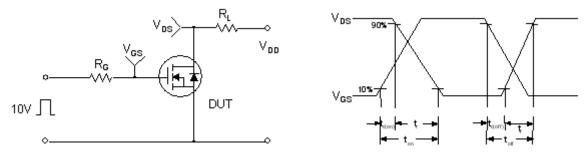


Figure 13. Resistive Switching Test Circuit & Waveforms

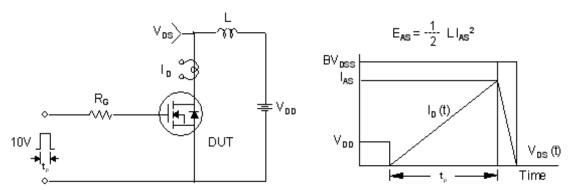
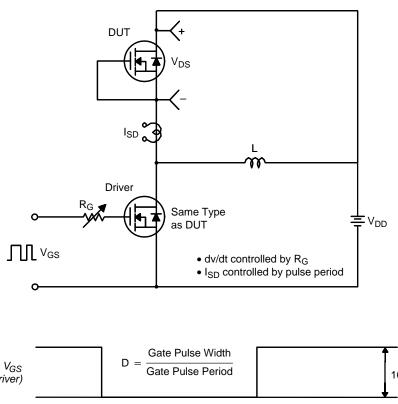


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



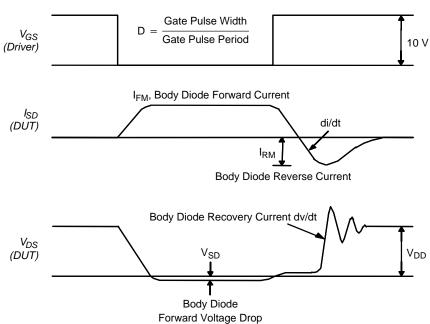


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

## PACKAGE MARKING AND ORDERING INFORMATION ( $T_C = 25$ °C, unless otherwise noted)

Device	Device Marking	Package Type	Reel Size	Tape Width	Shipping <sup>†</sup>
FQT1N80TF-WS	FQT1N80	SOT-223	330 mm	12 mm	4000 / Tape & Reel

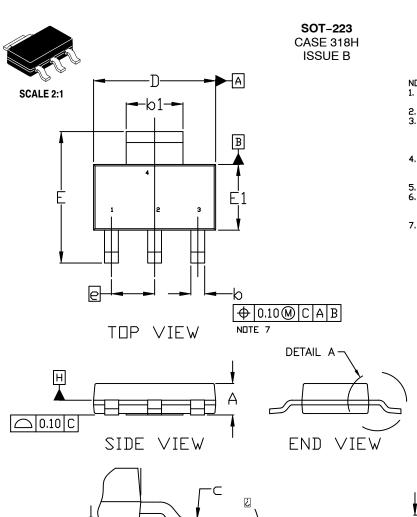
<sup>†</sup> For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

### **REVISION HISTORY**

Revision	Description of Changes	Date
4	Converted the Document to <b>onsemi</b> format.	9/22/2025

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.





### **DATE 13 MAY 2020**

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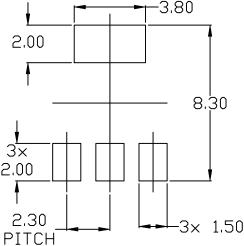
#### NUTES:

b AND b1.

j

- DIMENSIONING AND TOLERANCING PER ASME
- DIMENSIDNING AND TOLERANCING PER ASME Y14.5M, 2009.
  CONTROLLING DIMENSION: MILLIMETERS DIMENSIONS D & E1 ARE DETERMINED AT DATUM H. DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS DR GATE BURRS. SHALL NOT EXCEED 0.23mm PER SIDE.
  LEAD DIMENSIONS & AND &1 DO NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBBAR PROTRUSION. ALLOWABLE DAMBBAR PROTRUSION IS 0.08mm PER SIDE.
  DATUMS A AND B ARE DETERMINED AT DATUM H. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
  POSITIONAL TOLERANCE APPLIES TO DIMENSIONS & AND &1.

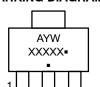
	MILLIMETERS			
DIM	MIN.	N□M.	MAX.	
Α			1.80	
A1	0.02	0.06	0.11	
b	0.60	0.74	0.88	
b1	2.90	3.00	3.10	
C	0.24		0.35	
D	6.30	6.50	6.70	
E	6.70	7.00	7.30	
E1	3,30	3.50	3.70	
е	2.30 BSC			
L	0.25			



0°

## **GENERIC MARKING DIAGRAM\***

A1



= Assembly Location

Υ = Year

DETAIL A

W = Work Week

XXXXX = Specific Device Code

= Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

## RECOMMENDED MOUNTING FOOTPRINT

For additional information on our Pb-Free strategy and soldering details, please download the IN Semiconductor Soldering and Mounting Techniques Reference Manual, SDLDERRM/D.

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DESCRIPTION:	SOT-223		PAGE 1 OF 1	

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