

FQPF10N20-VB Datasheet

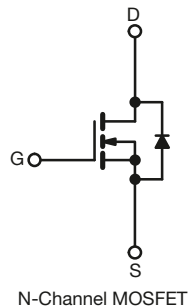
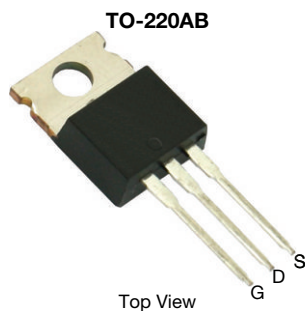
N-Channel 200 V (D-S) 175 °C MOSFET



RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

V_{DS} (V)	200
$R_{DS(on)}$ Typ. (Ω) at $V_{GS} = 10$ V	0.0076
$R_{DS(on)}$ Typ. (Ω) at $V_{GS} = 7.5$ V	0.0086
Q_g typ. (nC)	58
I_D (A)	100
Configuration	Single



FEATURES

- Thunder power MOSFET
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested

APPLICATIONS

- Power supplies:
 - Uninterruptible power supplies
 - AC/DC switch-mode power supplies
 - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	200	V
Gate-source voltage	V_{GS}	± 20	
Continuous drain current	$T_C = 25$ °C	100	A
	$T_C = 125$ °C	62	
Pulsed drain current ($t = 100$ μ s)	I_{DM}	300	
Continuous source-drain diode current	I_S	100	
Single pulse avalanche current ^a	I_{AS}	60	
Single pulse avalanche energy ^a	E_{AS}	180	mJ
Maximum power dissipation	$T_C = 25$ °C	375 ^b	W
	$T_C = 125$ °C	125 ^b	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^c		260	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R_{thJA}	40	°C/W
Junction-to-case (drain)	R_{thJC}	0.6	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).

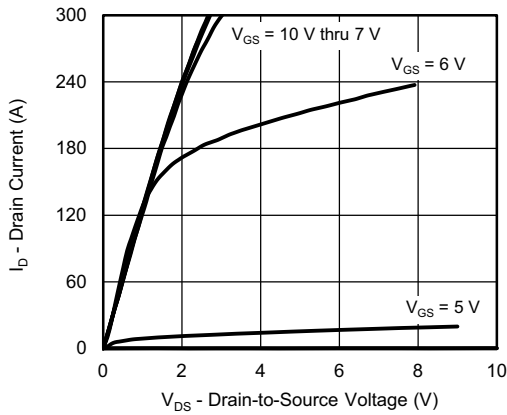
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	200	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2	-	4	V
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	250	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V	-	-	1	μA
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 125 °C	-	-	150	
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 175 °C	-	-	5	mA
On-state drain current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	60	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 40 A	-	0.0076	-	Ω
		V _{GS} = 7.5 V, I _D = 40 A	-	0.0086	-	
Forward transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 40 A	-	63	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = 100 V, V _{GS} = 0 V, f = 1 MHz	-	3120	-	pF
Output capacitance	C _{oss}		-	280	-	
Reverse transfer capacitance	C _{rss}		-	24	-	
Total gate charge	Q _g	V _{DS} = 100 V, V _{GS} = 10 V, I _D = 60 A	-	58	87	nC
Gate-source charge	Q _{gs}		-	17.6	-	
Gate-drain charge	Q _{gd}		-	17.2	-	
Output charge	Q _{oss}	V _{DS} = 100 V, V _{GS} = 0 V	-	108	162	
Gate resistance	R _g	f = 1 MHz	1.5	3	5	Ω
Turn-on delay time	t _{d(on)}	V _{DD} = 100 V, R _L = 1.66 Ω, I _D ≅ 60 A, V _{GEN} = 10 V, R _g = 1 Ω	-	14	28	ns
Rise time	t _r		-	125	250	
Turn-off delay time	t _{d(off)}		-	27	54	
Fall time	t _f		-	80	150	
Drain-Source Body Diode Characteristics						
Pulse diode forward current (t = 100 μs)	I _{SM}		-	-	240	A
Body diode voltage	V _{SD}	I _F = 30 A, V _{GS} = 0 V	-	0.85	1.5	V
Body diode reverse recovery time	t _{rr}	I _F = 30 A, dI/dt = 100 A/μs	-	150	300	ns
Body diode reverse recovery charge	Q _{rr}		-	0.9	1.8	nC
Reverse recovery fall time	t _a		-	125	-	ns
Reverse recovery rise time	t _b		-	25	-	
Body diode peak reverse recovery charge	I _{RM(REC)}			-	11.5	20

Notes

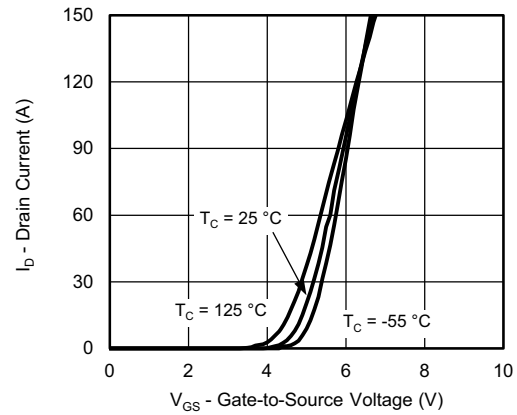
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

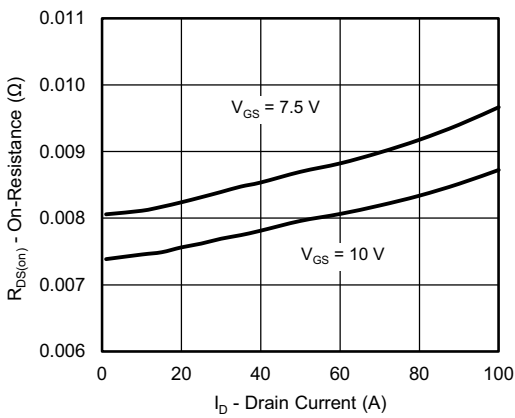
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



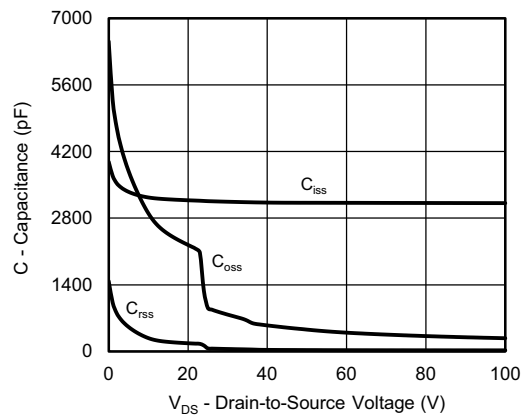
Output Characteristics



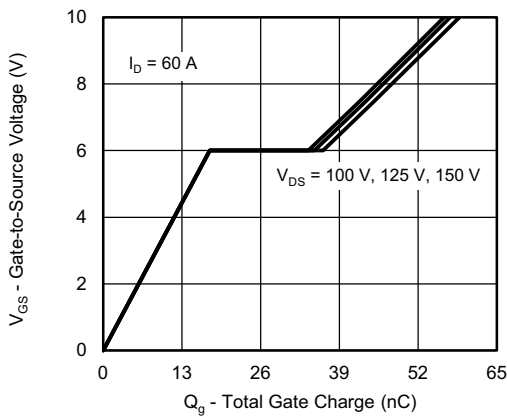
Transfer Characteristics



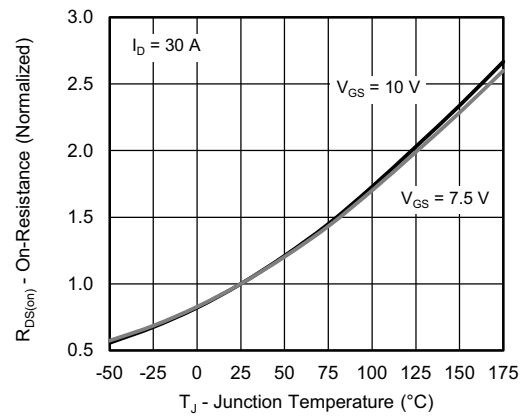
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

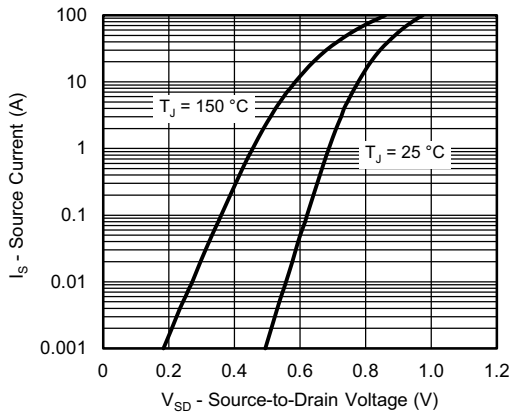


Gate Charge

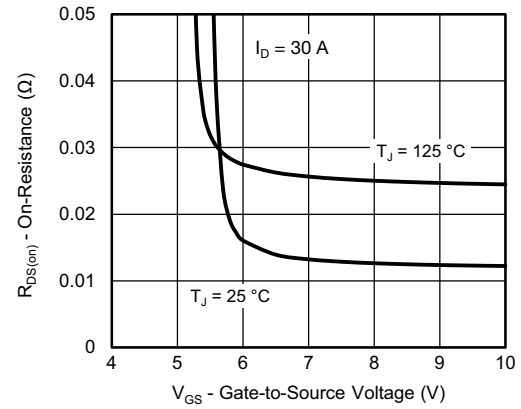


On-Resistance vs. Junction Temperature

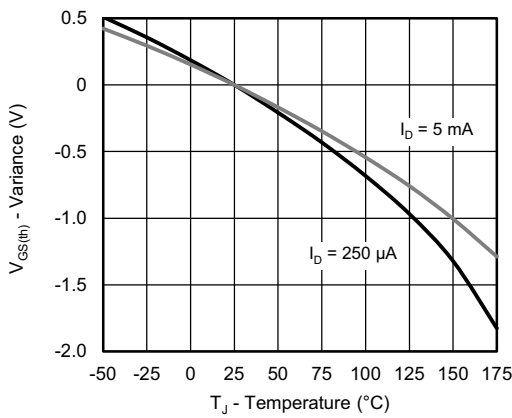
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



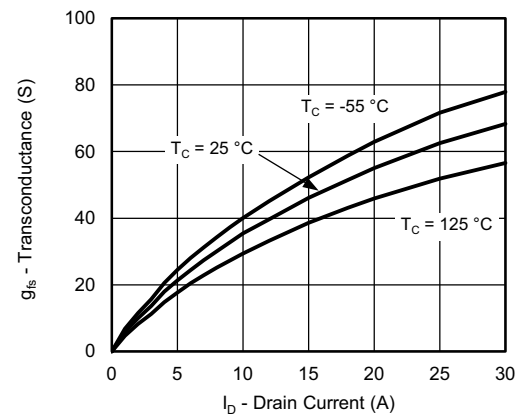
Source-Drain Diode Forward Voltage



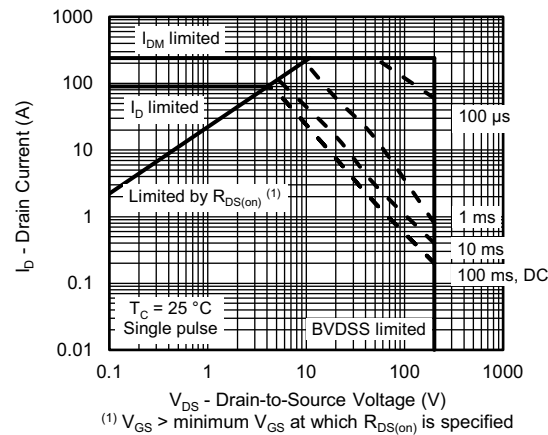
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



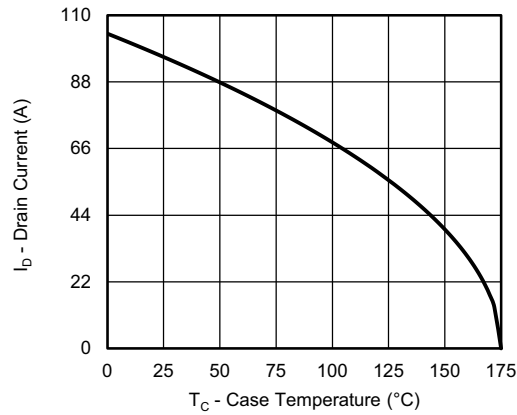
Transconductance



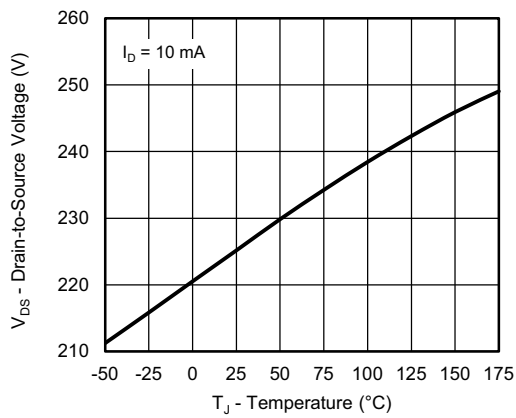
Safe Operating Area, Junction-to-Ambient

(1) V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

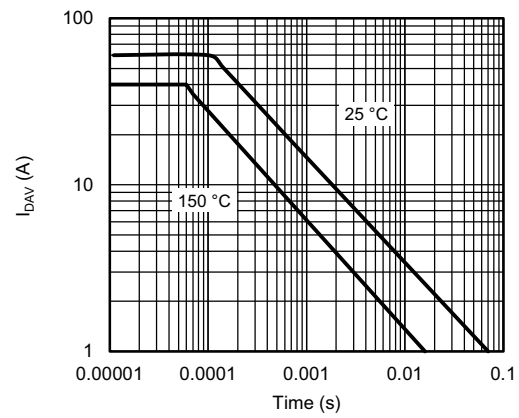
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Drain Source Breakdown vs. Junction Temperature

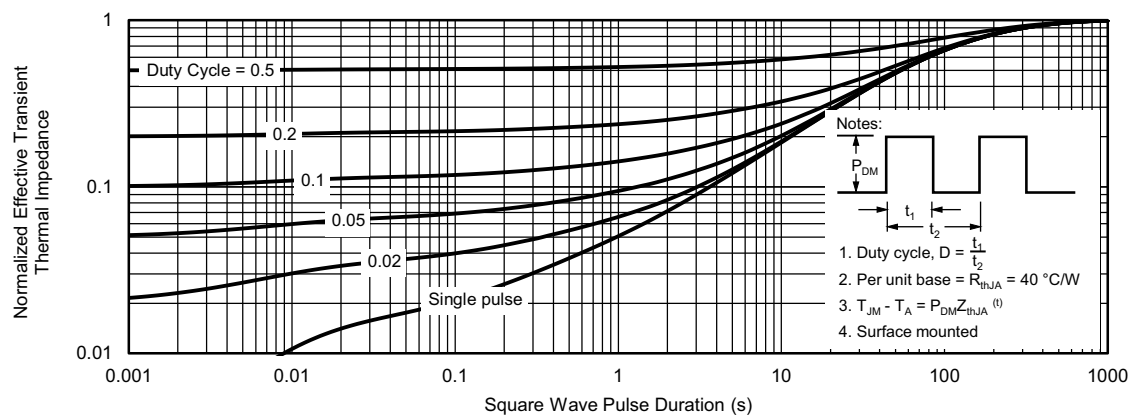


I_{DAV} vs. Time

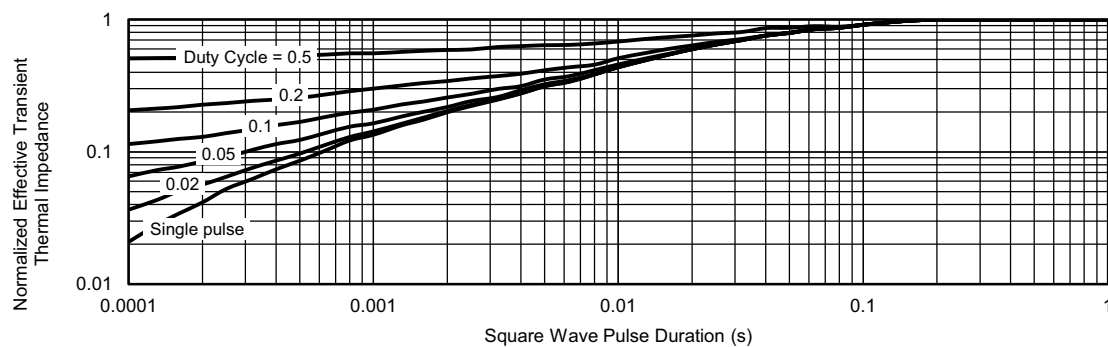
Note

- The power dissipation P_D is based on T_J max. = 25 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

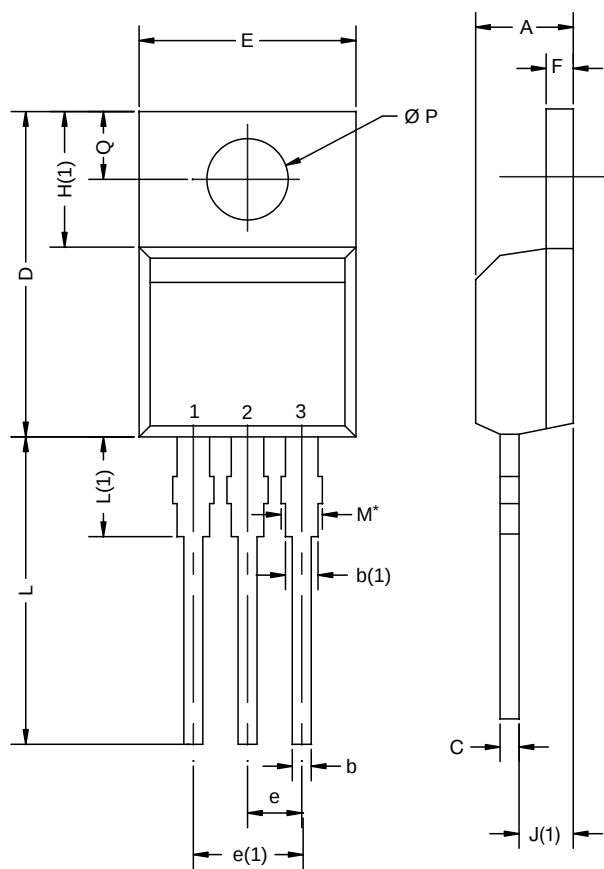


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

Notes
* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM

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