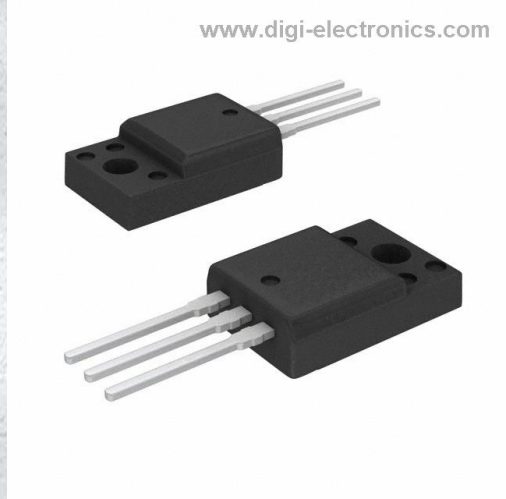
# FQPF2N80 Datasheet




| | |
|---|---|
| DiGi Electronics Part Number | FQPF2N80-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | FQPF2N80 |
| Description | MOSFET N-CH 800V 1.5A TO220F |
| Detailed Description | N-Channel 800 V 1.5A (Tc) 35W (Tc) Through Hole TO-220F-3 |

https://www.DiGi-Electronics.com

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| FQPF2N80 | onsemi |
| Series: | Product Status: |
| - | Active |
| FET Type: | Technology: |
| N-Channel | MOSFET (Metal Oxide) |
| Drain to Source Voltage (Vdss): | Current - Continuous Drain (Id) @ 25°C: |
| 800 V | 1.5A (Tc) |
| Drive Voltage (Max Rds On, Min Rds On): | Rds On (Max) @ Id, Vgs: |
| 10V | 6.3Ohm @ 750mA, 10V |
| Vgs(th) (Max) @ Id: | Gate Charge (Qg) (Max) @ Vgs: |
| 5V @ 250µA | 15 nC @ 10 V |
| Vgs (Max): | Input Capacitance (Ciss) (Max) @ Vds: |
| ±30V | 550 pF @ 25 V |
| FET Feature: | Power Dissipation (Max): |
| - | 35W (Tc) |
| Operating Temperature: | Mounting Type: |
| -55°C ~ 150°C (TJ) | Through Hole |
| Supplier Device Package: | Package / Case: |
| TO-220F-3 | TO-220-3 Full Pack |
| Base Product Number: | |
| FQPF2 | |

## Environmental & Export classification

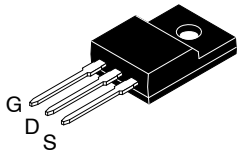
| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | Not Applicable |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.29.0095 | |

DATA SHEET
www.onsemi.com

# MOSFET – N-Channel, QFET

## 800 V, 1.5 A, 6.3 mΩ

# FQPF2N80




**TO−220 Fullpack,**
**3−Lead /**
**TO−220F−3SG**
**CASE 221AT**

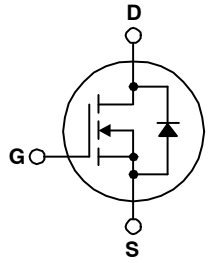
### Description

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.

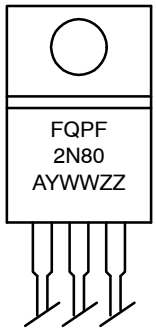
### Features

- 1.5 A, 800 V, $R_{DS(on)}$ = 6.3 Ω (Max.) @ $V_{GS}$ = 10 V, ID = 0.75 A
- Low Gate Charge (Typ. 12 nC)
- Low $C_{rss}$ (Typ. 5.5 pF)
- 100% Avalanche Tested

### N−CHANNEL MOSFET




### MARKING DIAGRAM




| | |
|---|---|
| FQPF2N80 | = Specific Device Code |
| A | = Assembly Location |
| YWW | = Date Code (Year & Week) |
| ZZ | = Assembly Lot |

### ORDERING INFORMATION

| Device | Package | Shipping |
|---|---|---|
| FQPF2N80 | TO−220 Fullpack | 1,000 Units / Tube |

# FQPF2N80

## ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25°C unless otherwise noted)

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain−Source Voltage | | 800 | V |
| $I_D$ | Drain Current | − Continuous ($T_C$ = 25°C)<br>− Continuous ($T_C$ = 100°C) | 1.5<br>0.95 | A<br>A |
| $I_{DM}$ | Drain Current | − Pulsed (Note 1) | 6.0 | A |
| $V_{GSS}$ | Gate−Source Voltage | | ±30 | V |
| $E_{AS}$ | Single Pulsed Avalanche Energy (Note 2) | | 180 | mJ |
| $I_{AR}$ | Avalanche Current (Note 1) | | 1.5 | A |
| $E_{AR}$ | Repetitive Avalanche Energy (Note 1) | | 3.5 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | | 4.0 | V/ns |
| $P_D$ | Power Dissipation | ($T_C$ = 25°C)<br>− Derate Above 25°C | 35<br>0.28 | W<br>W/°C |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | −55 to +150 | °C |
| $T_L$ | Maximum Lead Temperature for Soldering, 1/8” from Case for 5 Seconds | | 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.

## THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction−to−Case, Max. | 3.57 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction−to−Ambient, Max. | 62.5 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_C$ = 25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain−Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 800 | − | − | V |
| $\Delta BV_{DSS}$ / $\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 μA, Referenced to 25°C | − | 0.9 | − | V/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 800 V, $V_{GS}$ = 0 V<br>$V_{DS}$ = 640 V, $T_C$ = 125°C | −<br>− | −<br>− | 10<br>100 | μA<br>μA |
| $I_{GSSF}$ | Gate−Body Leakage Current, Forward | $V_{GS}$ = 30 V, $V_{DS}$ = 0 V | − | − | 100 | nA |
| $I_{GSSR}$ | Gate−Body Leakage Current, Reverse | $V_{GS}$ = −30 V, $V_{DS}$ = 0V | − | − | −100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 μA | 3.0 | − | 5.0 | V |
| $R_{DS(on)}$ | Static Drain−Source On−Resistance | $V_{GS}$ = 10 V, $I_D$ = 0.75 A | − | 4.6 | 6.3 | Ω |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 50 V, $I_D$ = 0.75 A | − | 2.2 | − | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1.0 MHz | − | 425 | 550 | pF |
| $C_{oss}$ | Output Capacitance | | − | 45 | 60 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | − | 5.5 | 7.0 | pF |

# FQPF2N80

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted)(continued)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **SWITCHING CHARACTERISTICS** | | | | | | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{DD}$ = 400 V, $I_D$ = 2.4 A, $R_G$ = 25 Ω (Note 4) | – | 12 | 35 | ns |
| $t_r$ | Turn−On Rise Time | | – | 30 | 70 | ns |
| $t_{d(off)}$ | Turn−Off Delay Time | | – | 25 | 60 | ns |
| $t_f$ | Turn−Off Fall Time | | – | 28 | 65 | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 640 V, $I_D$ = 2.4 A, $V_{GS}$ = 10 V (Note 4) | – | 12 | 15 | nC |
| $Q_{gs}$ | Gate−Source Charge | | – | 2.6 | – | nC |
| $Q_{gd}$ | Gate−Drain Charge | | – | 6.0 | – | nC |
| **DRAIN−SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS** | | | | | | |
| $I_S$ | Maximum Continuous Drain−Source Diode Forward Current | | – | – | 1.5 | A |
| $I_{SM}$ | Maximum Pulsed Drain−Source Diode Forward Current | | – | – | 6.0 | A |
| $V_{SD}$ | Drain−Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = 1.5 A | – | – | 1.4 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, $I_S$ = 2.4 A, $dI_F/dt$ = 100 A/μs | – | 480 | – | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | – | 2.0 | – | μC |

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.

1. Repetitive rating: pulse−width limited by maximum junction temperature.
2. L = 150 mH, $I_{AS}$ = 1.5 A, $V_{DD}$ = 50 V, $R_G$ = 25 Ω, starting $T_J$ = 25°C.
3. $I_{SD}$ ≤ 2.4 A, di/dt ≤ 200 A/μs, $V_{DD}$ ≤ $BV_{DSS}$, starting $T_J$ = 25°C.
4. Essentially independent of operating temperature.

# FQPF2N80

## TYPICAL CHARACTERISTICS

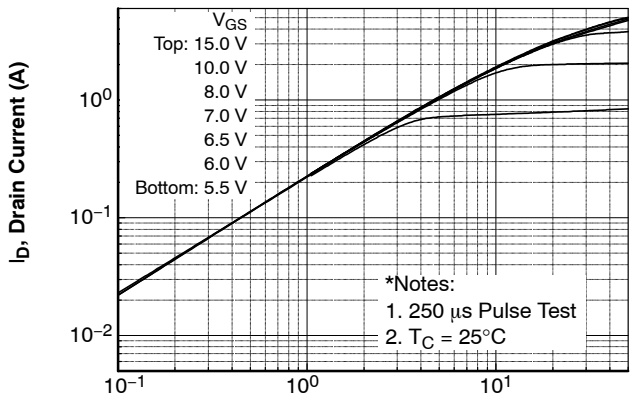



**Figure 1. On−Region Characteristics**

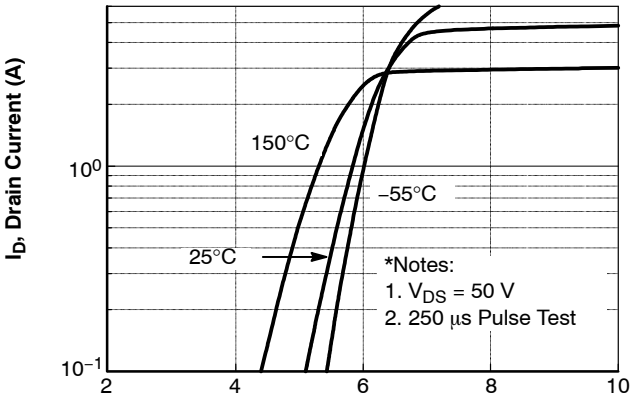



**Figure 2. Transfer Characteristics**

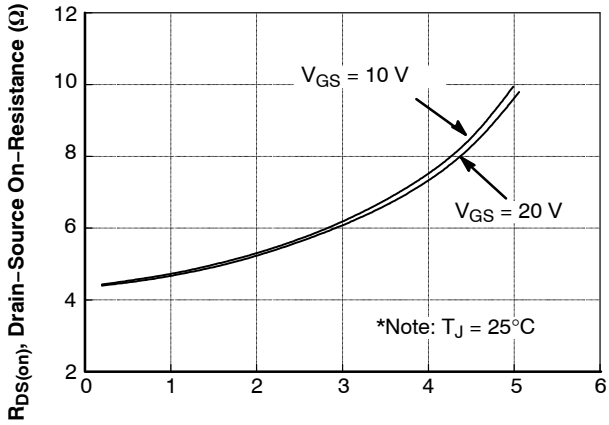



**Figure 3. On−Resistance Variation vs. Drain Current and Gate Voltage**

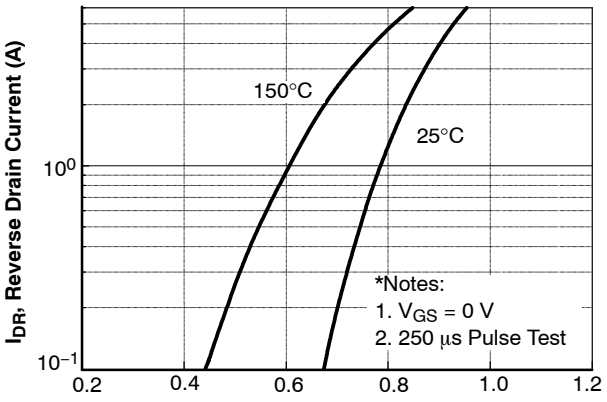



**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**

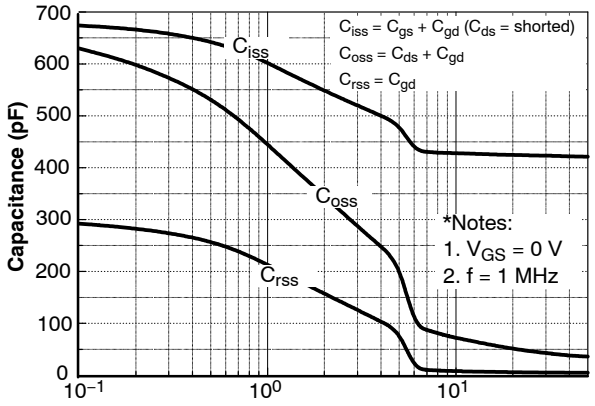



**Figure 5. Capacitance Characteristics**

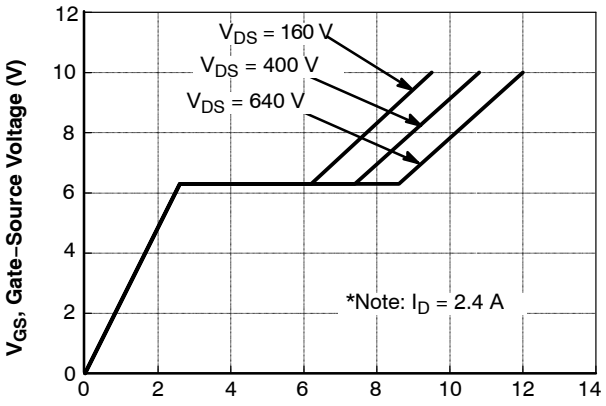



**Figure 6. Gate Charge Characteristics**

# FQPF2N80

## TYPICAL CHARACTERISTICS (continued)

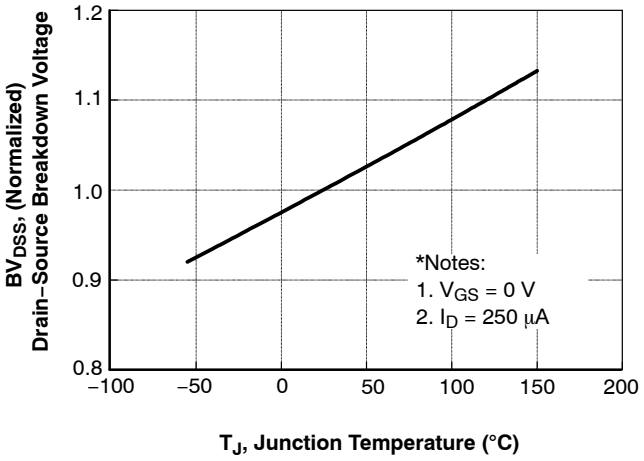



Figure 7. Breakdown Voltage Variation vs. Temperature

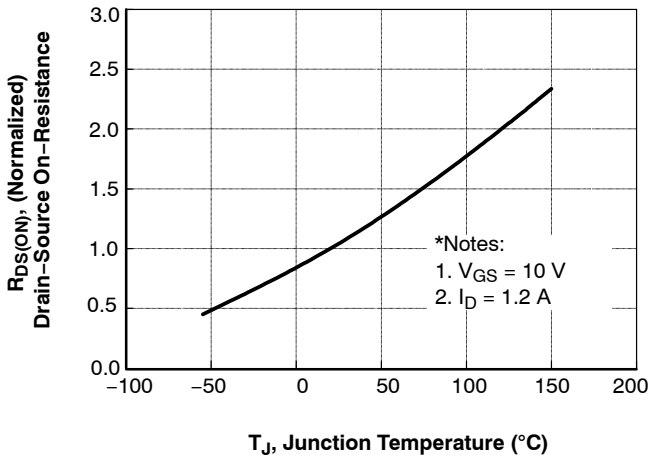



Figure 8. On–Resistance Variation vs. Temperature

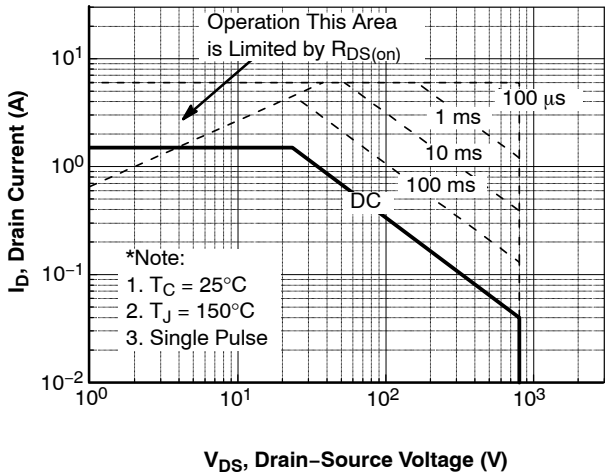



Figure 9. Maximum Safe Operating Area

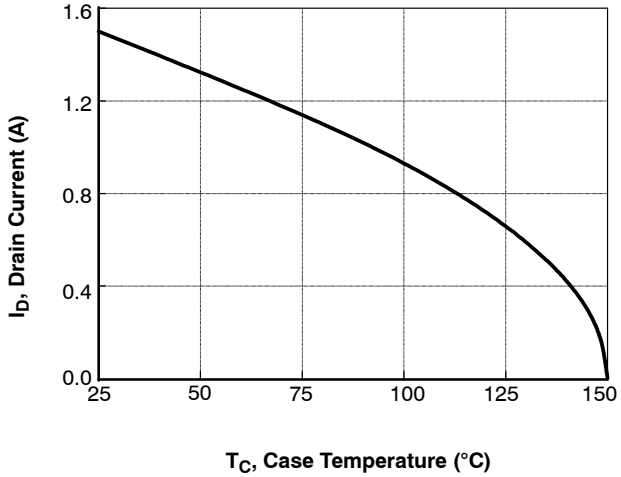



Figure 10. Maximum Drain Current vs. Case Temperature

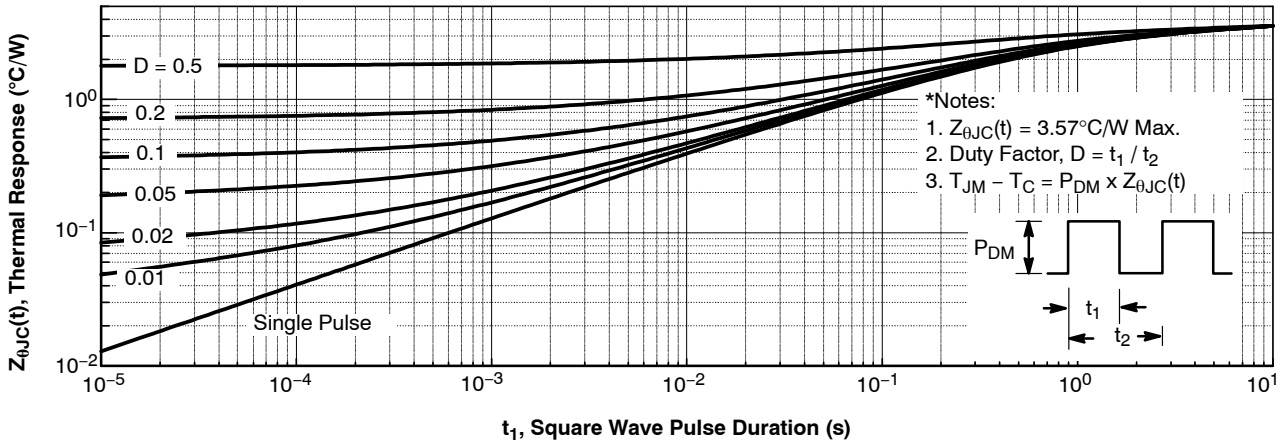



Figure 11. Transient Thermal Response Curve

**FQPF2N80**

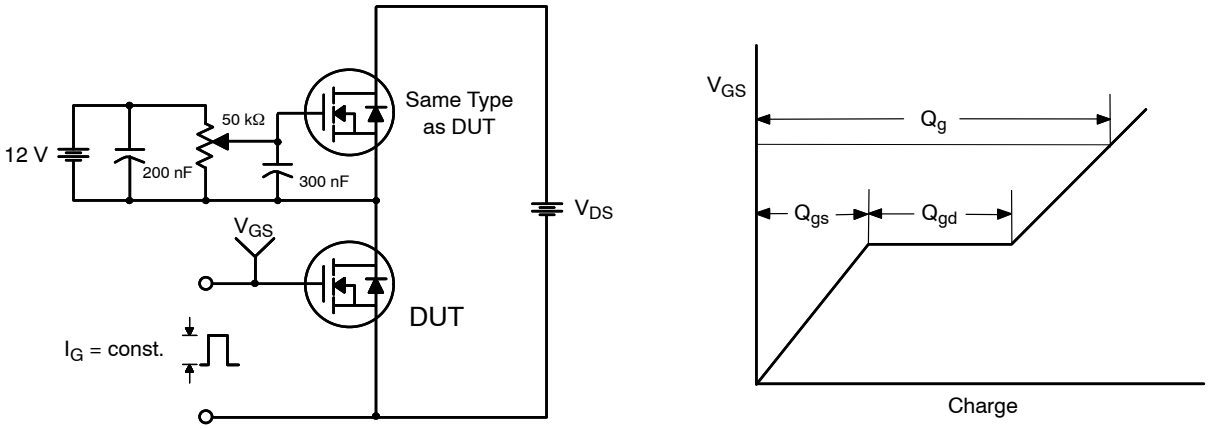



**Figure 12. Gate Charge Test Circuit & Waveform**

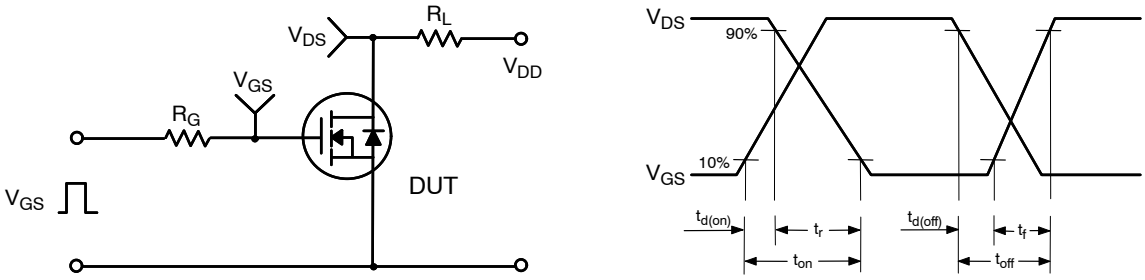



**Figure 13. Resistive Switching Test Circuit & Waveforms**

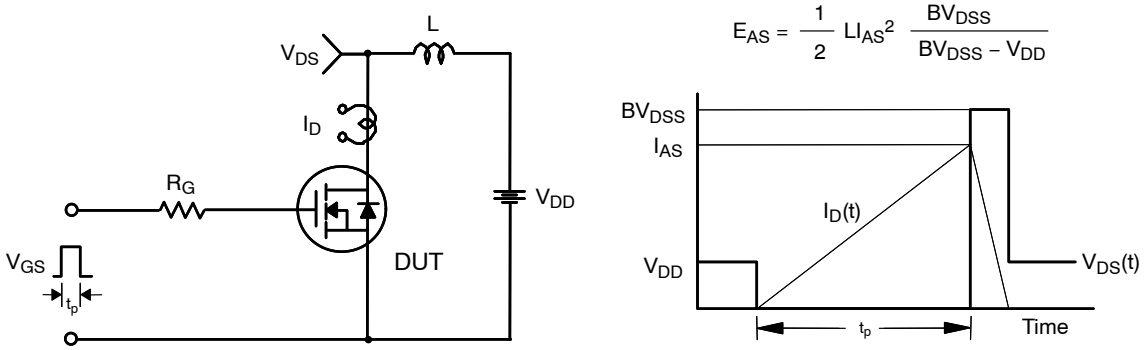



**Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms**

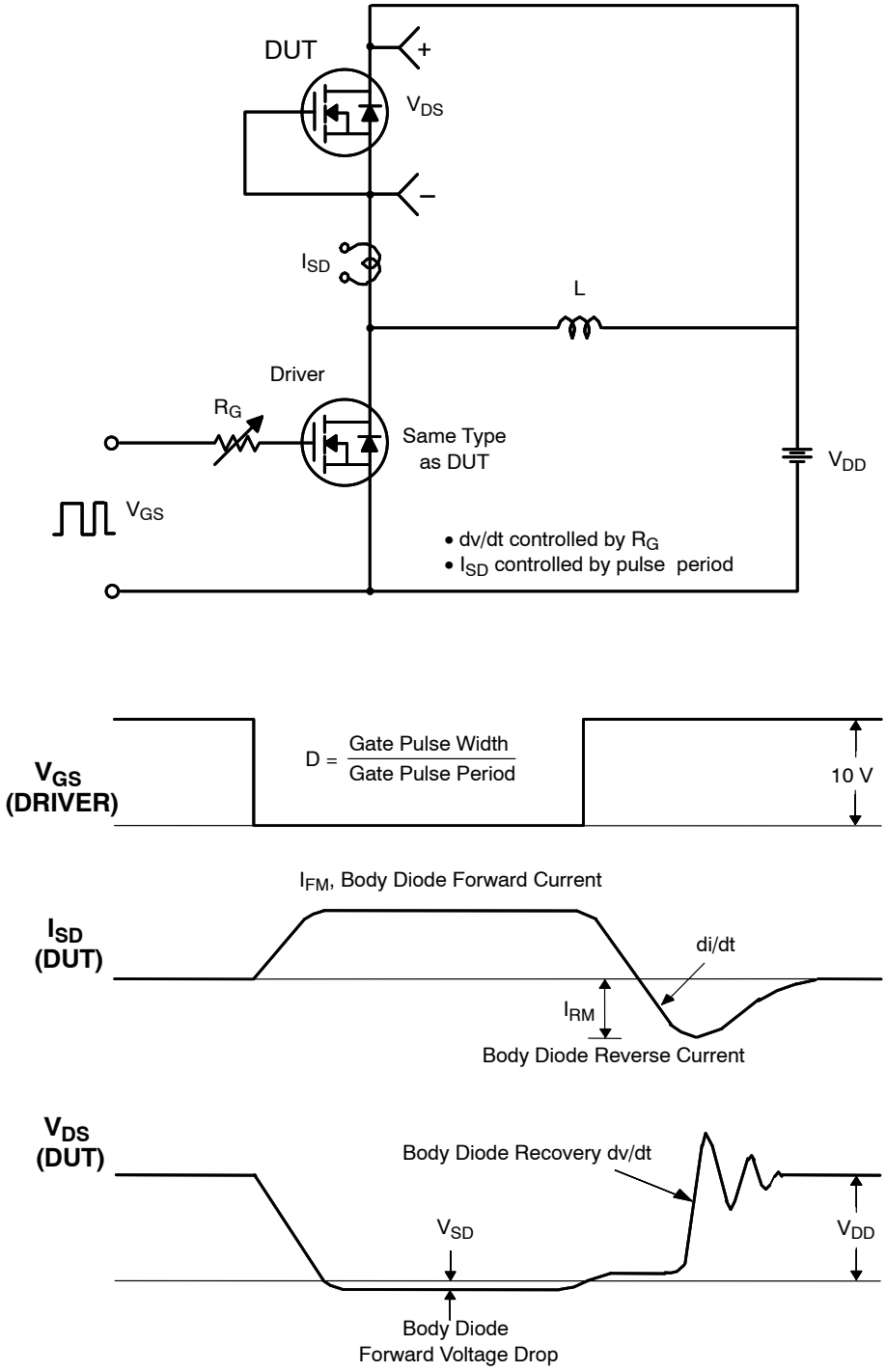
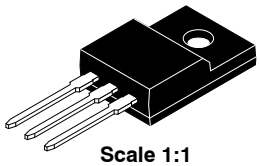



**Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms**

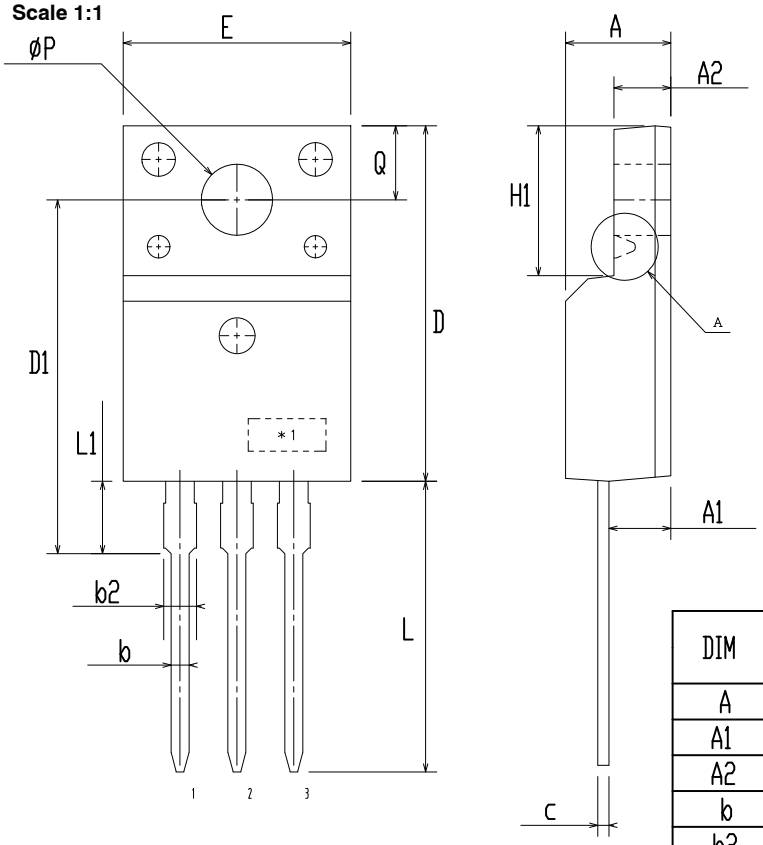
# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS

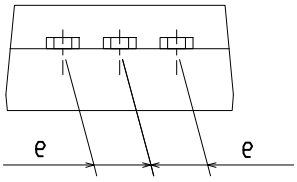
**TO−220 Fullpack, 3−Lead / TO−220F−3SG**
CASE 221AT
ISSUE B

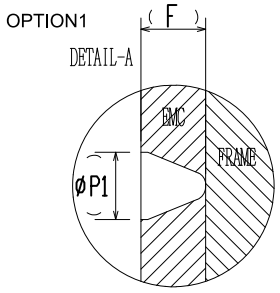
DATE 19 JAN 2021



**Scale 1:1**




| DIM | MILLIMITERS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 4.50 | 4.70 | 4.90 |
| A1 | 2.56 | 2.76 | 2.96 |
| A2 | 2.34 | 2.54 | 2.74 |
| b | 0.70 | 0.80 | 0.90 |
| b2 | ~ | ~ | 1.47 |
| c | 0.45 | 0.50 | 0.60 |
| D | 15.67 | 15.87 | 16.07 |
| D1 | 15.60 | 15.80 | 16.00 |
| E | 9.96 | 10.16 | 10.36 |
| e | 2.34 | 2.54 | 2.74 |
| F | ~ | 0.84 | ~ |
| H1 | 6.48 | 6.68 | 6.88 |
| L | 12.78 | 12.98 | 13.18 |
| L1 | 3.03 | 3.23 | 3.43 |
| ø P | 2.98 | 3.18 | 3.38 |
| ø P1 | ~ | 1.00 | ~ |
| Q | 3.20 | 3.30 | 3.40 |

NOTES:
A. DIMENSION AND TOLERANCE AS ASME Y14.5-2009
B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUCSIONS.
C. OPTION 1 - WITH SUPPORT PIN HOLE
OPTION 2 - NO SUPPORT PIN HOLE

| | | | |
|---|---|---|---|
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| **DESCRIPTION:** | **TO−220 FULLPACK, 3−LEAD / TO−220F−3SG** | | **PAGE 1 OF 1** |

## ADDITIONAL INFORMATION

**TECHNICAL PUBLICATIONS**:
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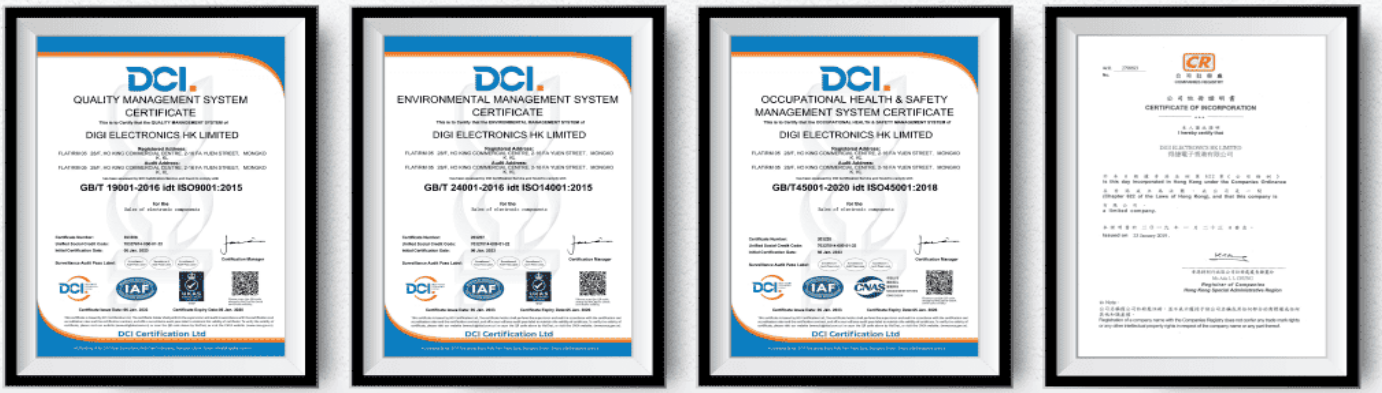



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