

150V P-Channel Enhancement Mode MOSFET

General Features

- High Dense Cell Design for Low $R_{DS(ON)}$
- Rugged Polysilicon Gate Cell Structure
- RoHS Compliant
- Halogen-free Available
- 100% Avalanche Tested

| Part Number | BV_{DSX} | $R_{DS(ON)}$ (Typ.) | I_D |
|-------------|------------|---------------------|-------|
| FTE02P15G | -150V | 0.20 Ω | -2.3A |
| FTP02P15G | -150V | 0.20 Ω | -15A |

TO-220AB

SOP-8

Applications

- Reset Switch for Active Clamp Reset
- DC-DC Converters



Ordering Information

| Part Number | Package | Marking | Remark |
|-------------|----------|---------|--------------|
| FTE02P15G | SOP-8 | 02P15 | Halogen Free |
| FTP02P15G | TO-220AB | 02P15 | Halogen Free |

Absolute Maximum Ratings

 $T_A = 25^\circ\text{C}$ unless otherwise

| Symbol | Parameter | FTE02P15G | FTP02P15G | Unit |
|---------------------|---|------------|-----------|------|
| V_{DSX} | Drain-to-Source Voltage ^[1] | -150 | -150 | V |
| V_{DGX} | Drain-to-Gate Voltage ^[1] | -150 | -150 | V |
| I_D | Continuous Drain Current | -2.3 | -15 | A |
| I_{DM} | Pulsed Drain Current ^[2] | -9.2 | -60 | |
| P_D | Power Dissipation | 2.5 | 100 | W |
| | Derating Factor above 25°C | 0.02 | 0.8 | W/°C |
| V_{GS} | Gate-to-Source Voltage | ±20 | | V |
| E_{AS} | Single Pulse Avalanche Energy ^[3] | 200 | | mJ |
| I_{AR} | Avalanche Current ^[2] | -4.0 | | A |
| T_L | Soldering Temperature Distance of 1.6mm from case for 10 seconds | 300 | | °C |
| T_J and T_{STG} | Operating and Storage Temperature Range | -55 to 150 | | |

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

| Symbol | Parameter | FTE02P15G | FTP02P15G | Unit |
|-----------------|---|-----------|-----------|------|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 50 | 1.25 | °C/W |

Electrical Characteristics

OFF Characteristics

 $T_A = 25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|------------|-----------------------------------|------|------|------|---------|-------------------------------|
| BV_{DSX} | Drain-to-Source Breakdown Voltage | -150 | -- | -- | V | $V_{GS}=0V, I_{DS}=-250\mu A$ |
| I_{DSS} | Drain-to-Source Leakage Current | -- | -- | -1 | μA | $V_{DS}=-150V, V_{GS}=0V$ |
| I_{GSS} | Gate-to-Source Leakage Current | -- | -- | 100 | nA | $V_{GS}=+20V, V_{DS}=0V$ |
| | | -- | -- | -100 | | $V_{GS}=-20V, V_{DS}=0V$ |

ON Characteristics

 $T_A = 25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|--------------|--------------------------------------|------|------|------|----------|---------------------------------|
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance | -- | 0.20 | 0.30 | Ω | $V_{GS}=-10V, I_{DS}=-1.3A$ [4] |
| $V_{GS(th)}$ | Gate Threshold Voltage | -1.8 | -- | -4.0 | V | $V_{GD}=0V, I_{DS}=-250\mu A$ |
| gfs | Forward Transconductance | -- | 4.5 | -- | S | $V_{DS}=-50V, I_{DS}=-1.3A$ |

Dynamic Characteristics

Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|-----------|-------------------------------|------|-------|------|------|--|
| C_{iss} | Input Capacitance | -- | 1420 | -- | pF | $V_{GS}=0V$ $V_{DS}=-25V$ $f=1.0MHz$ |
| C_{oss} | Output Capacitance | -- | 180.5 | -- | | |
| C_{rss} | Reverse Transfer Capacitance | -- | 38.4 | -- | | |
| Q_g | Total Gate Charge | -- | 35.1 | -- | nC | $V_{DS}=-120V$ $I_D=-1.3A$ $V_{GS}=-10V$ |
| Q_{gs} | Gate-to-Source Charge | -- | 9.6 | -- | | |
| Q_{gd} | Gate-to-Drain (Miller) Charge | -- | 13.8 | -- | | |

Resistive Switching Characteristics

Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|--------------|---------------------|------|------|------|------|--|
| $t_{d(on)}$ | Turn-on Delay Time | -- | 16.5 | -- | ns | $V_{GS}=-10V$ $V_{DD}=-75V$ $R_G=6.5\Omega$ $I_D=-1.3A$ |
| t_{rise} | Rise Time | -- | 14.6 | -- | | |
| $t_{d(off)}$ | Turn-off Delay Time | -- | 35.0 | -- | | |
| t_{fall} | Fall Time | -- | 24.6 | -- | | |

Source-Drain Diode Characteristics

 $T_A = 25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|----------|-----------------------|------|------|------|------|--------------------------|
| V_{SD} | Diode Forward Voltage | -- | -- | 1.5 | V | $I_{SD}=1.3A, V_{GS}=0V$ |

NOTE:

[1] $T_J = +25^\circ\text{C}$ to $+150^\circ\text{C}$.

[2] Repetitive rating, pulse width limited by maximum junction temperature.

[3] $L=25mH, R_G=25\Omega, I_{AS}=-4.0A$, Starting $T_J=25^\circ\text{C}$.

[4] Pulse width $\leq 380\mu s$; duty cycle $\leq 2\%$.

Typical Characteristics

Figure 1. Maximum Power Dissipation vs. Case Temperature

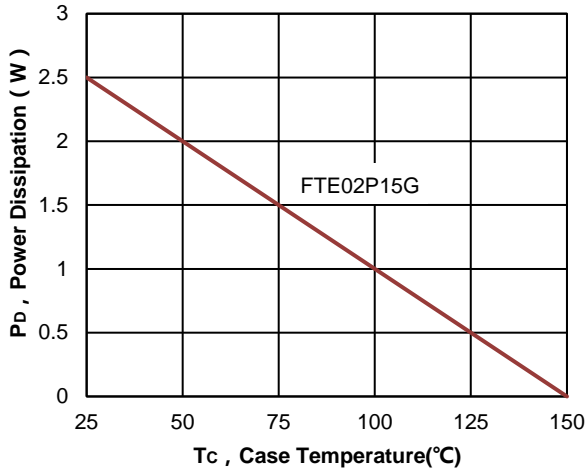


Figure 2. Maximum Power Dissipation vs. Case Temperature

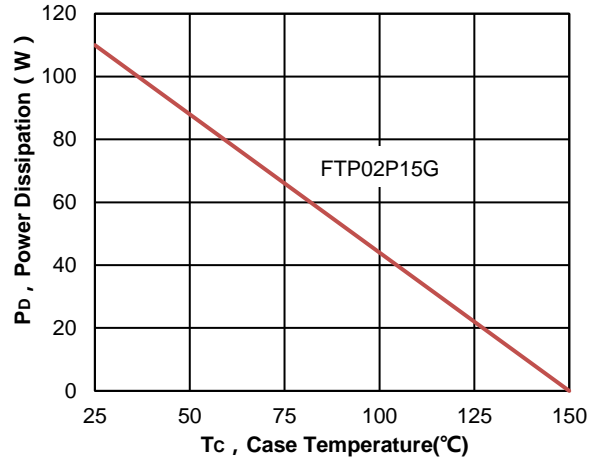


Figure 3. Maximum Continuous Drain Current vs. Case Temperature

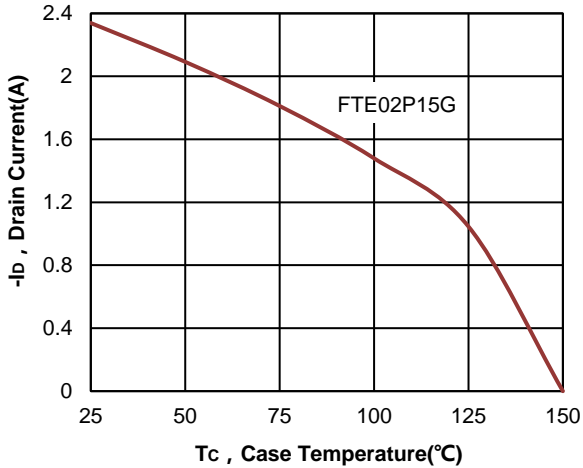


Figure 4. Maximum Continuous Drain Current vs Case Temperature

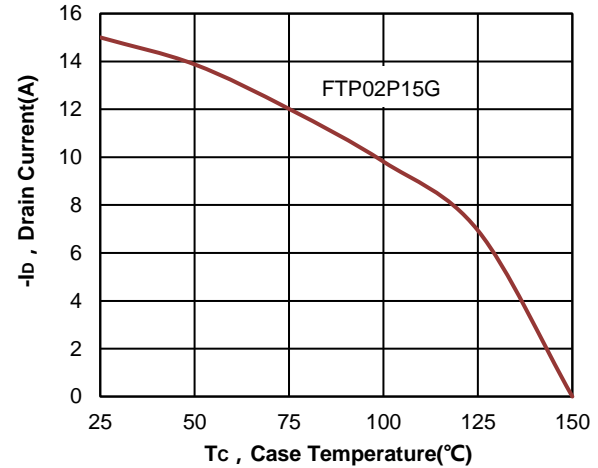


Figure 5. Typical Output Characteristics

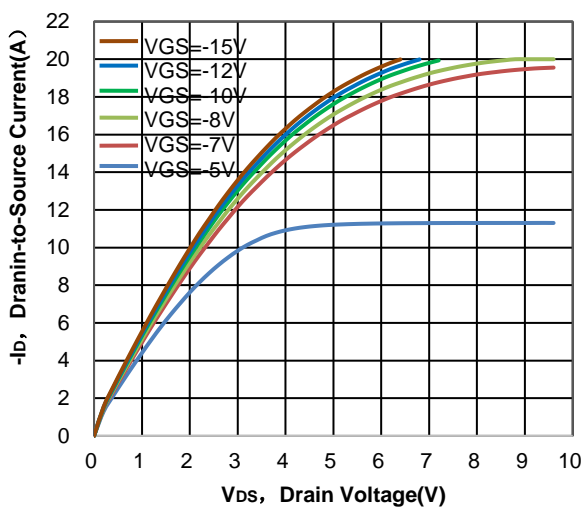


Figure 6. Typical Transfer Characteristics

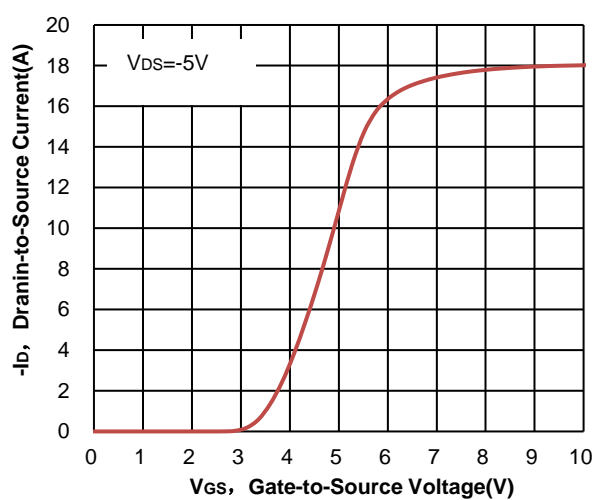


Figure 7. Typical Capacitance vs. Drain-to-Source Voltage

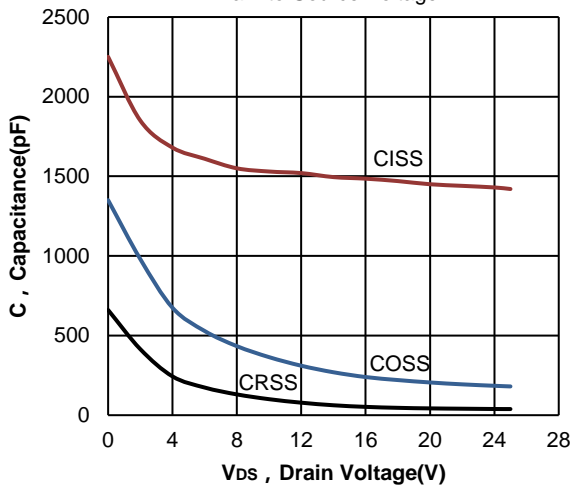


Figure 8. Typical Gate Charge vs. Gate-to-Source Voltage

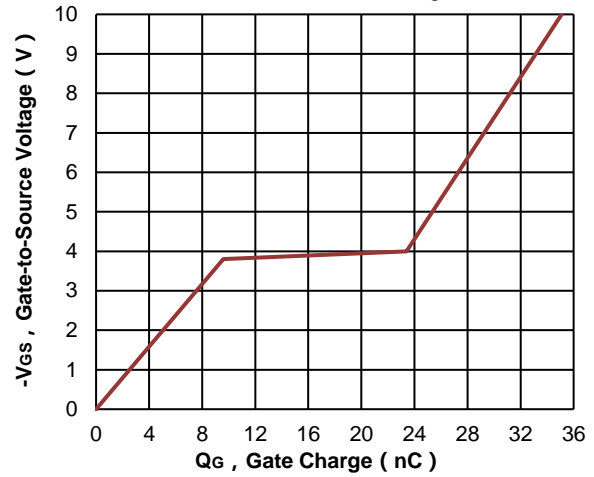


Figure 9. Maximum Rated Safe Operating Area

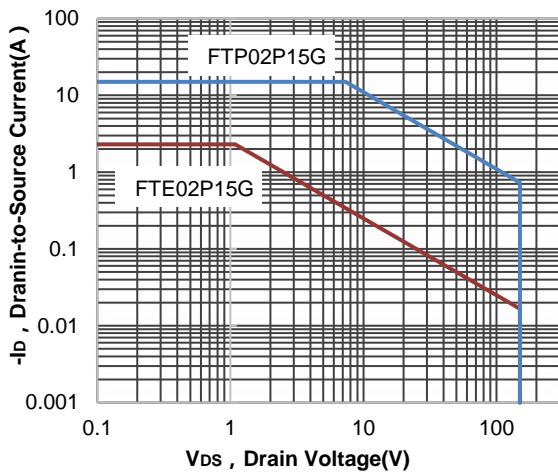


Figure 10. Drain-to-Source On-Resistance vs. Drain Current

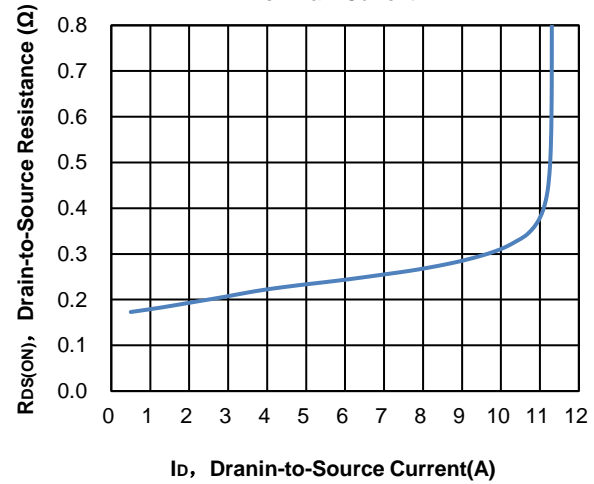


Figure 11. Drain-to-Source On-Resistance vs. Junction Temperature

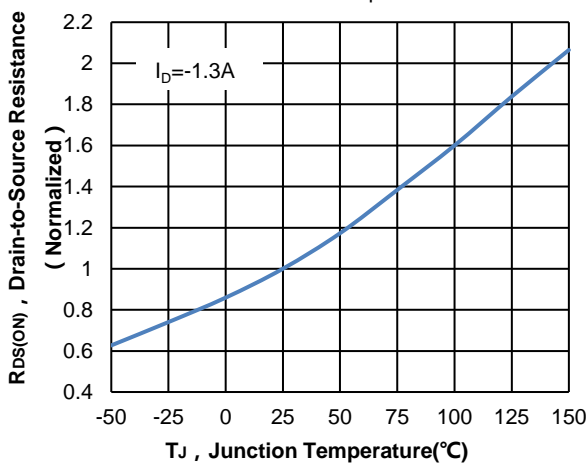
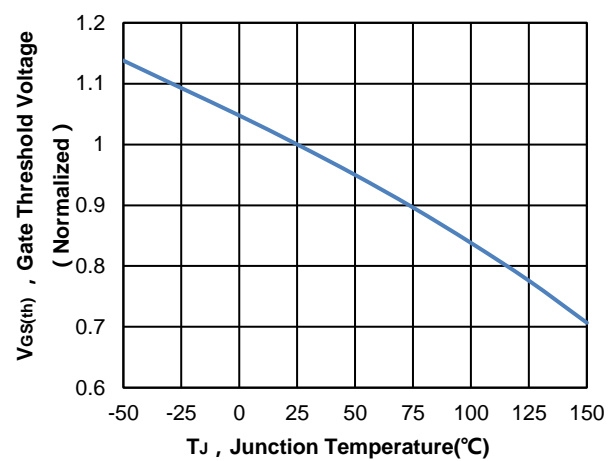
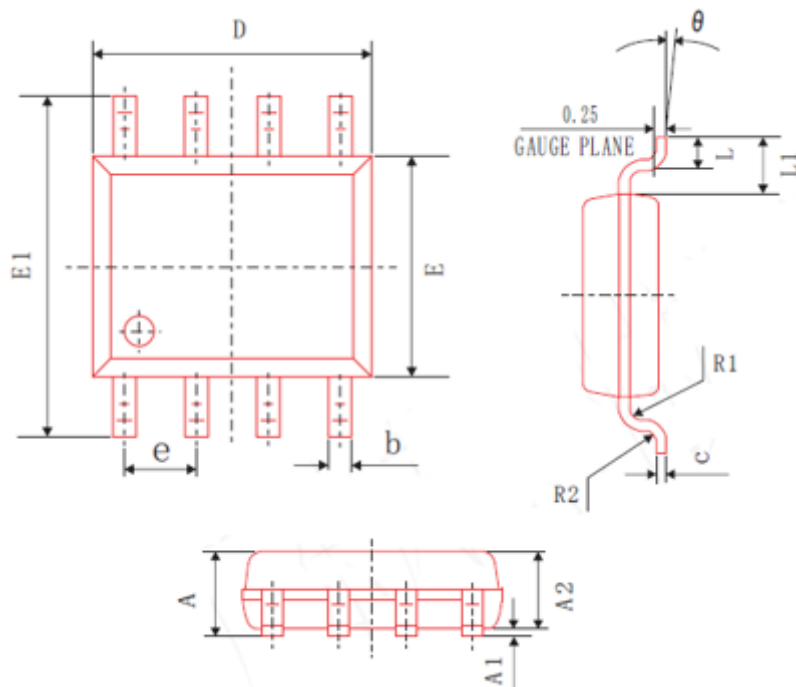
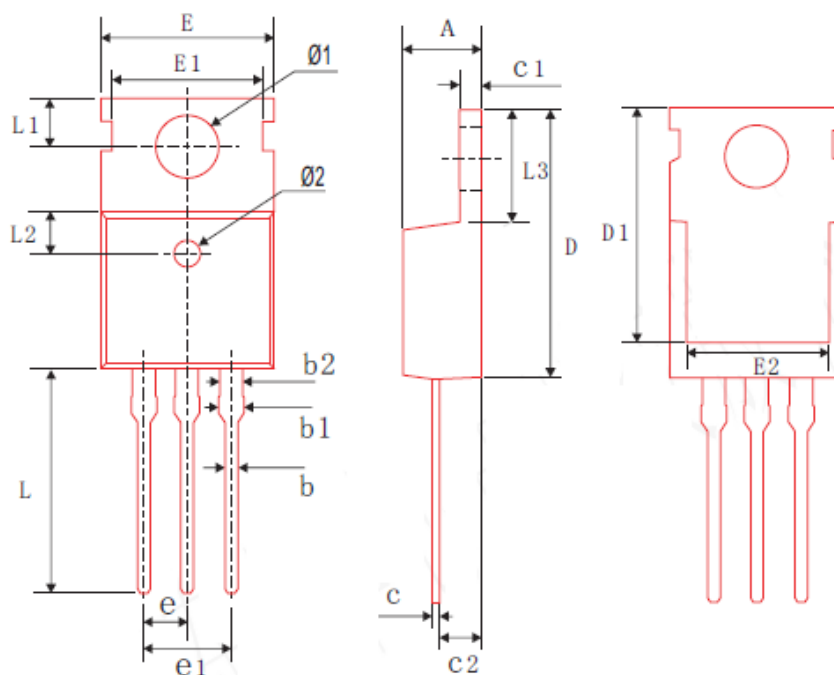


Figure 12. Gate Threshold Voltage vs. Junction Temperature



Package Dimensions
SOP-8


| SYMBOM | MIN | NOM | MAX |
|----------|----------|-------|-------|
| A | 1.40 | 1.60 | 1.80 |
| A1 | 0.05 | 0.15 | 0.25 |
| A2 | 1.35 | 1.45 | 1.55 |
| b | 0.30 | 0.40 | 0.50 |
| c | 0.153 | 0.203 | 0.253 |
| D | 4.80 | 4.90 | 5.00 |
| E | 3.80 | 3.90 | 4.00 |
| E1 | 5.80 | 6.00 | 6.20 |
| L | 0.45 | 0.70 | 1.00 |
| θ | 2° | 4° | 6° |
| L1 | 1.04 REF | | |
| e | 1.27 BSC | | |
| R1 | 0.07 TYP | | |
| R2 | 0.07 TYP | | |

TO-220AB


| SYMBOM | MIN | NOM | MAX |
|--------|----------|-------|-------|
| A | 4.30 | 4.50 | 4.70 |
| b | 0.70 | 0.80 | 0.90 |
| b1 | -- | -- | 1.42 |
| b2 | 1.17 | 1.27 | 1.37 |
| c | 0.40 | 0.50 | 0.60 |
| c1 | 1.25 | 1.30 | 1.35 |
| c2 | 2.20 | 2.40 | 2.60 |
| D | 15.45 | 15.65 | 15.85 |
| D1 | 13.20 | 13.40 | 13.60 |
| E | 9.80 | 10.0 | 10.2 |
| E1 | 8.60 | 8.70 | 8.80 |
| E2 | 7.80 | 8.00 | 8.20 |
| e1 | 4.88 | 5.08 | 5.28 |
| L | 12.95 | 13.15 | 13.35 |
| L1 | 2.70 | 2.80 | 2.90 |
| L2 | 2.40 | 2.50 | 2.60 |
| L3 | 6.30 | 6.50 | 6.70 |
| θ1 | 3.50 | 3.60 | 3.70 |
| θ2 | 1.35 | 1.50 | 1.65 |
| e | 2.54 BSC | | |



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