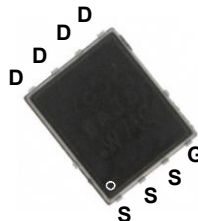
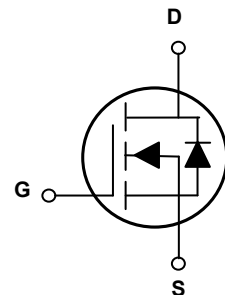


## Main Product Characteristics

|              |               |
|--------------|---------------|
| $BV_{DSS}$   | 100V          |
| $R_{DS(ON)}$ | 3.6m $\Omega$ |
| $I_D$        | 140A          |



PPAK5x6



Schematic Diagram

## Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



## Description

The GSFP10140 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

## Absolute Maximum Ratings ( $T_C=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter                                              | Symbol          | Max.        | Unit                        |
|--------------------------------------------------------|-----------------|-------------|-----------------------------|
| Drain-Source Voltage                                   | $V_{DS}$        | 100         | V                           |
| Gate-Source Voltage                                    | $V_{GS}$        | $\pm 20$    | V                           |
| Drain Current-Continuous ( $T_C=25^{\circ}\text{C}$ )  | $I_D$           | 140         | A                           |
| Drain Current-Continuous ( $T_C=100^{\circ}\text{C}$ ) |                 | 88          |                             |
| Drain Current-Pulsed <sup>1</sup>                      | $I_{DM}$        | 560         | A                           |
| Single Pulse Avalanche Energy <sup>2</sup>             | $E_{AS}$        | 405         | mJ                          |
| Single Pulse Avalanche Current <sup>2</sup>            | $I_{AS}$        | 90          | A                           |
| Power Dissipation ( $T_C=25^{\circ}\text{C}$ )         | $P_D$           | 192         | W                           |
| Power Dissipation-De-rate above $25^{\circ}\text{C}$   |                 | 1.54        | W/ $^{\circ}\text{C}$       |
| Thermal Resistance, Junction-to-Ambient                | $R_{\theta JA}$ | 62          | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case                   | $R_{\theta JC}$ | 0.65        | $^{\circ}\text{C}/\text{W}$ |
| Operating Junction Temperature Range                   | $T_J$           | -55 To +150 | $^{\circ}\text{C}$          |
| Storage Temperature Range                              | $T_{STG}$       | -55 To +150 | $^{\circ}\text{C}$          |

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

| Parameter                                                     | Symbol       | Conditions                                                    | Min. | Typ. | Max.      | Unit       |
|---------------------------------------------------------------|--------------|---------------------------------------------------------------|------|------|-----------|------------|
| <b>On/Off Characteristics</b>                                 |              |                                                               |      |      |           |            |
| Drain-Source Breakdown Voltage                                | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                     | 100  | -    | -         | V          |
| Drain-Source Leakage Current                                  | $I_{DSS}$    | $V_{DS}=80V, V_{GS}=0V, T_J=25^{\circ}\text{C}$               | -    | -    | 1         | $\mu A$    |
|                                                               |              | $V_{DS}=80V, V_{GS}=0V, T_J=85^{\circ}\text{C}$               | -    | -    | 10        |            |
| Gate-Source Leakage Current                                   | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                   | -    | -    | $\pm 100$ | nA         |
| Static Drain-Source On-Resistance <sup>3</sup>                | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=20A$                                         | -    | 3.1  | 3.6       | m $\Omega$ |
|                                                               |              | $V_{GS}=4.5V, I_D=15A$                                        | -    | 3.9  | 5.1       |            |
| Gate Threshold Voltage                                        | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$                                 | 1.2  | 1.6  | 2.5       | V          |
| Forward Transconductance                                      | $g_{fs}$     | $V_{DS}=10V, I_D=3A$                                          | -    | 22   | -         | S          |
| <b>Dynamic and Switching Characteristics</b>                  |              |                                                               |      |      |           |            |
| Total Gate Charge <sup>3,4</sup>                              | $Q_g$        | $V_{DS}=50V, I_D=70A, V_{GS}=10V$                             | -    | 65.0 | 100       | nC         |
| Gate-Source Charge <sup>3,4</sup>                             | $Q_{gs}$     |                                                               | -    | 9.5  | 15        |            |
| Gate-Drain Charge <sup>3,4</sup>                              | $Q_{gd}$     |                                                               | -    | 14   | 21        |            |
| Turn-On Delay Time <sup>3,4</sup>                             | $t_{d(on)}$  | $V_{DD}=50V, R_G=6\Omega, V_{GS}=10V, I_D=70A$                | -    | 24   | 36        | nS         |
| Rise Time <sup>3,4</sup>                                      | $t_r$        |                                                               | -    | 20   | 30        |            |
| Turn-Off Delay Time <sup>3,4</sup>                            | $t_{d(off)}$ |                                                               | -    | 45   | 70        |            |
| Fall Time <sup>3,4</sup>                                      | $t_f$        |                                                               | -    | 25   | 40        |            |
| Input Capacitance                                             | $C_{iss}$    | $V_{DS}=50V, V_{GS}=0V, F=1\text{MHz}$                        | -    | 4000 | 6000      | pF         |
| Output Capacitance                                            | $C_{oss}$    |                                                               | -    | 750  | 1150      |            |
| Reverse Transfer Capacitance                                  | $C_{rss}$    |                                                               | -    | 10   | 15        |            |
| Gate Resistance                                               | $R_g$        | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$                         | -    | 1.8  | -         | $\Omega$   |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |              |                                                               |      |      |           |            |
| Continuous Source Current                                     | $I_S$        | $V_G=V_D=0V, \text{Force Current}$                            | -    | -    | 140       | A          |
| Pulsed Source Current                                         | $I_{SM}$     |                                                               | -    | -    | 280       | A          |
| Diode Forward Voltage                                         | $V_{SD}$     | $V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$                   | -    | -    | 1         | V          |
| Reverse Recovery Time                                         | $t_{rr}$     | $V_R=100V, I_S=10A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$ | -    | 210  | -         | nS         |
| Reverse Recovery Charge                                       | $Q_{rr}$     |                                                               | -    | 490  | -         | nC         |

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=90A, R_G=25\Omega, \text{starting } T_J=25^{\circ}\text{C}$ .
3. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

## Typical Electrical and Thermal Characteristic Curves

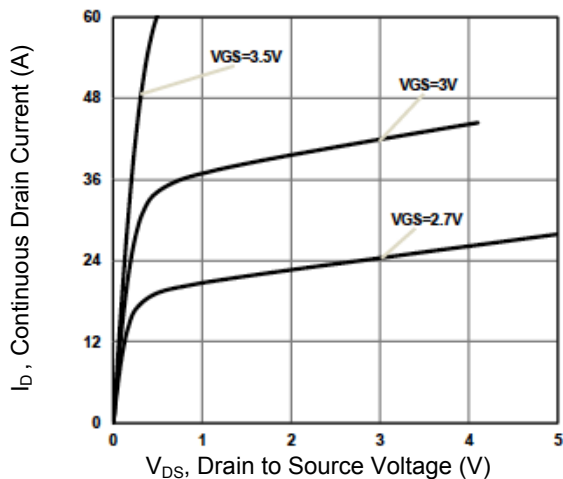


Figure 1. Typical Output Characteristics

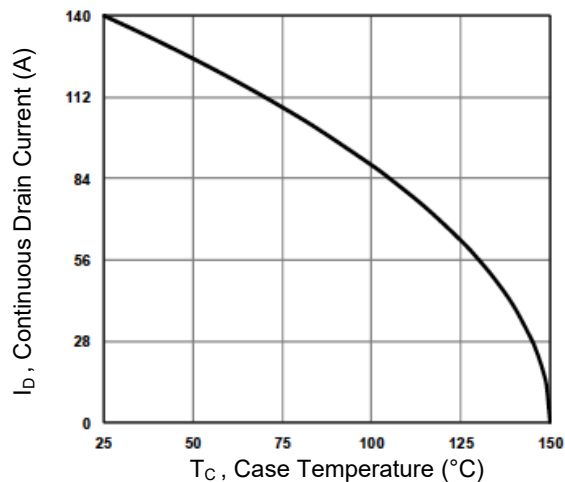


Figure 2. Continuous Drain Current vs.  $T_C$

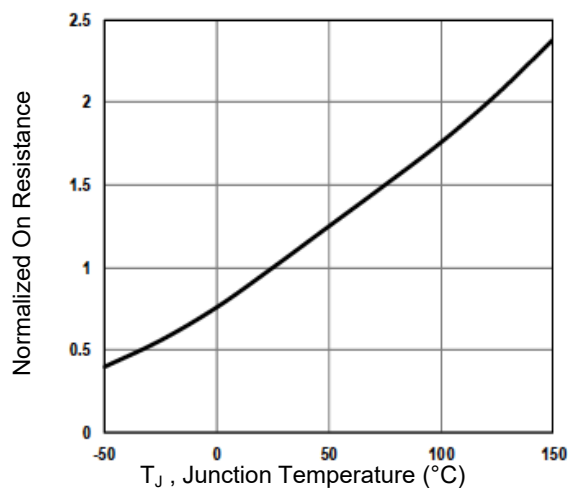


Figure 3. Normalized  $R_{DS(on)}$  vs.  $T_J$

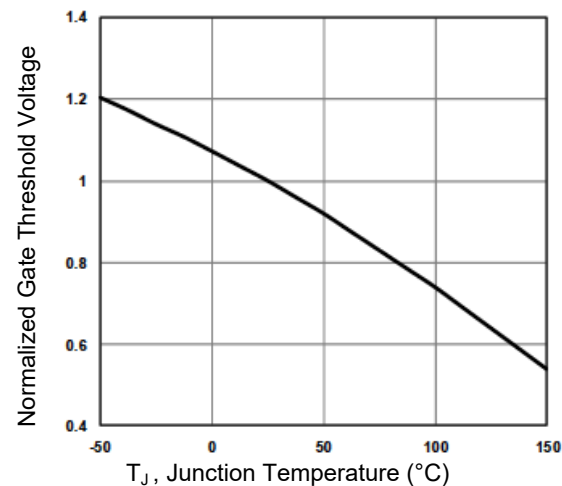


Figure 4. Normalized  $V_{th}$  vs.  $T_J$

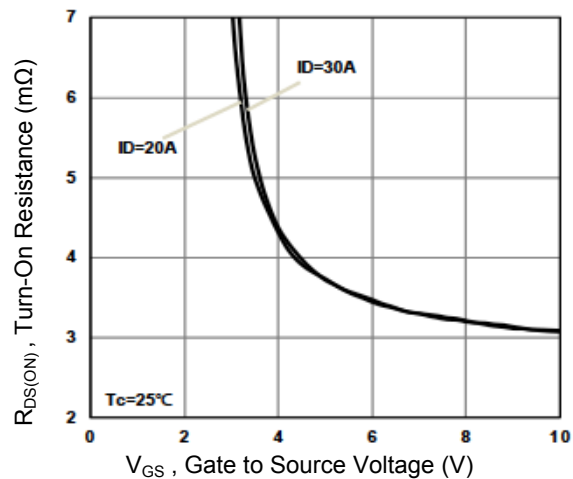


Figure 5. Turn-On Resistance vs.  $V_{GS}$

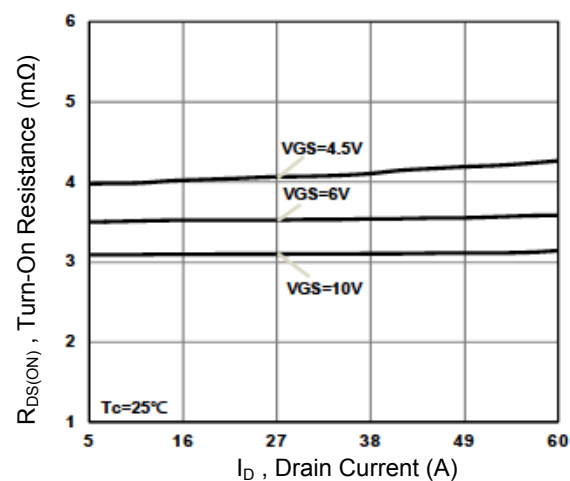


Figure 6. Turn-On Resistance vs.  $I_D$

## Typical Electrical and Thermal Characteristic Curves

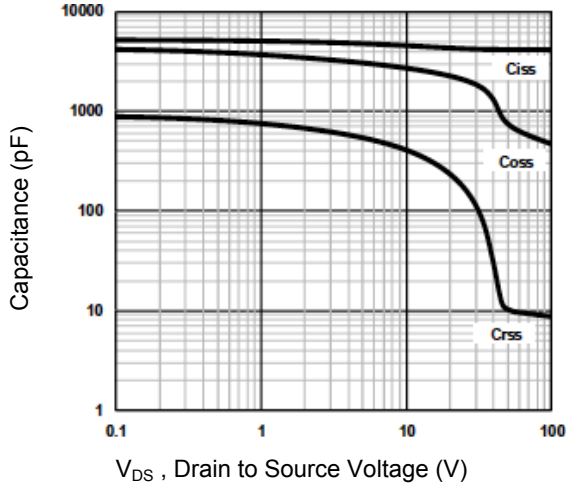


Figure 7. Capacitance Characteristics

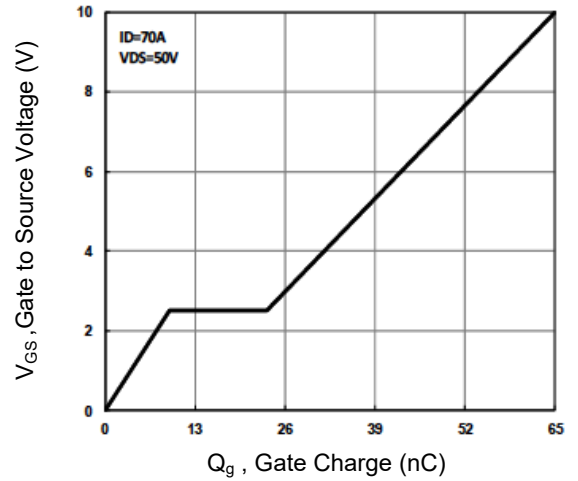


Figure 8. Gate Charge Waveform

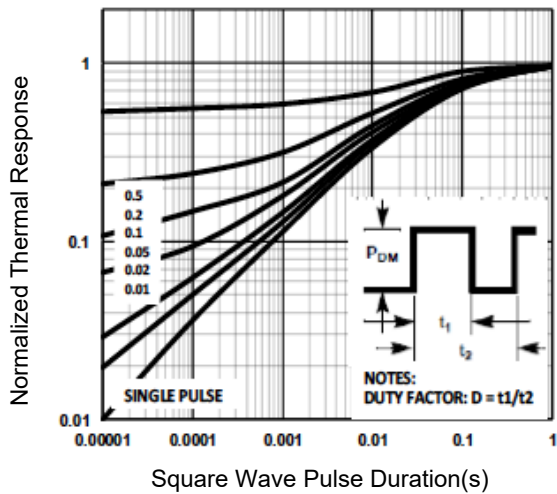


Figure 9. Normalized Transient Impedance

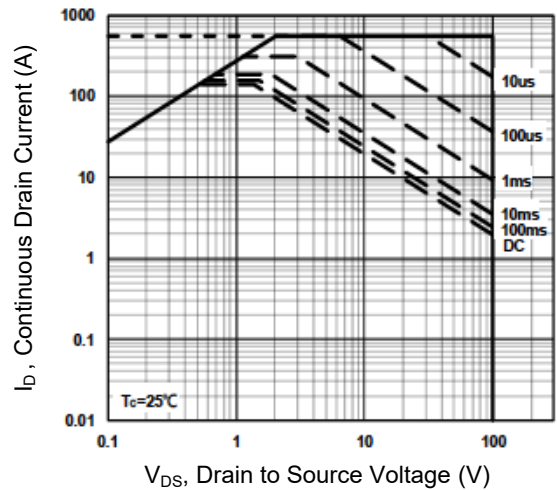


Figure 10. Maximum Safe Operation Area

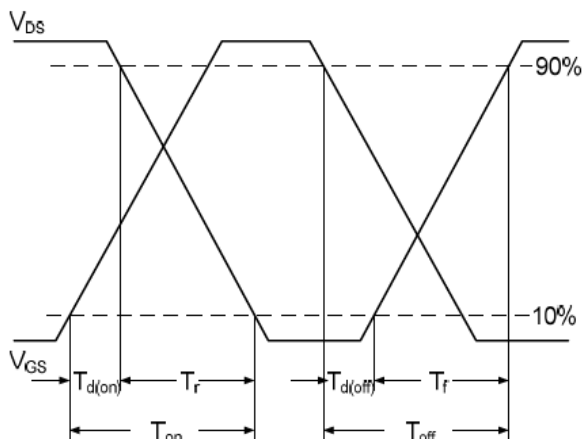


Figure 11. Switching Time Waveform

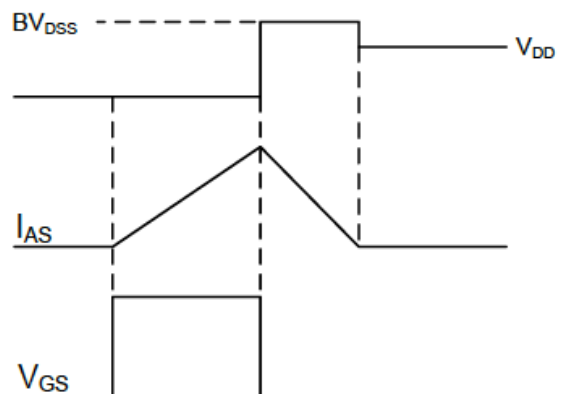
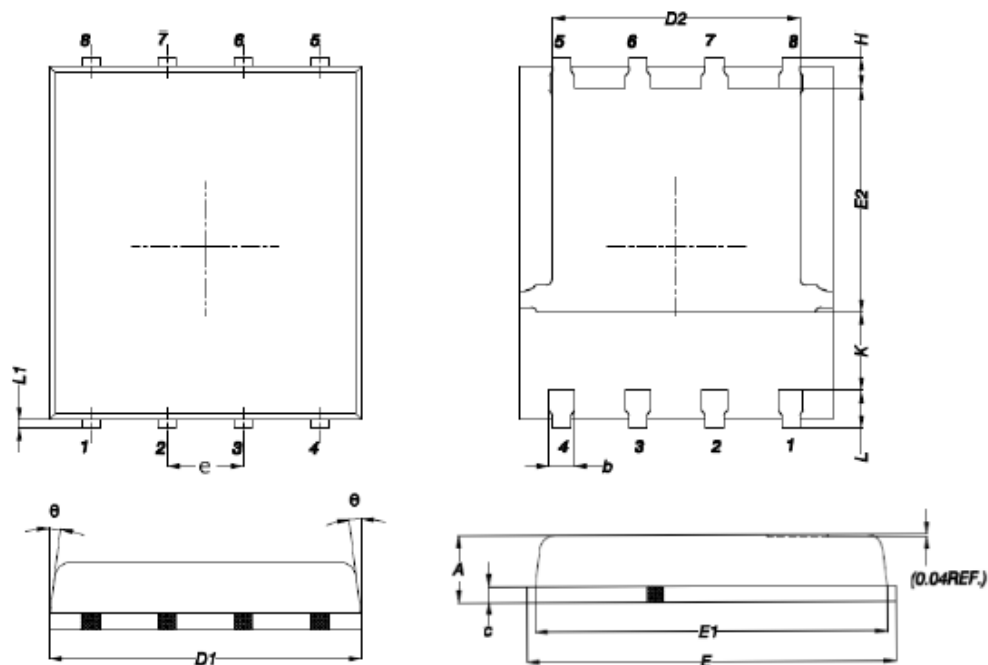


Figure 12. EAS Waveform

## Package Outline Dimensions (PPAK5x6)



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | MAX                       | MIN   | MAX                  | MIN   |
| A      | 1.200                     | 0.850 | 0.047                | 0.031 |
| b      | 0.510                     | 0.300 | 0.020                | 0.012 |
| C      | 0.300                     | 0.200 | 0.012                | 0.008 |
| D1     | 5.400                     | 4.800 | 0.212                | 0.189 |
| D2     | 4.310                     | 3.610 | 0.170                | 0.142 |
| E      | 6.300                     | 5.850 | 0.248                | 0.230 |
| E1     | 5.960                     | 5.450 | 0.235                | 0.215 |
| E2     | 3.920                     | 3.300 | 0.154                | 0.130 |
| e      | 1.27BSC                   |       | 0.05BSC              |       |
| H      | 0.650                     | 0.380 | 0.026                | 0.015 |
| K      | -                         | 1.100 | -                    | 0.043 |
| L      | 0.710                     | 0.380 | 0.028                | 0.015 |
| L1     | 0.250                     | 0.050 | 0.009                | 0.002 |
| θ      | 12°                       | 0°    | 12°                  | 0°    |