



**Advanced Power  
Electronics Corp.**

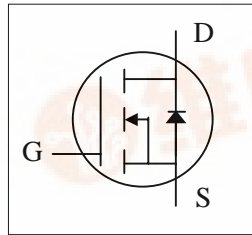
**IRF840**

**RoHS-compliant Product**

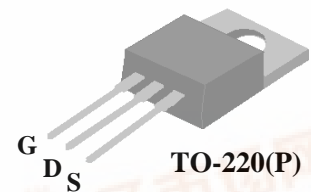
*N-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

- ▼ Ease of Paralleling
- ▼ Fast Switching Characteristic
- ▼ Simple Drive Requirement



|              |               |
|--------------|---------------|
| $BV_{DSS}$   | 500V          |
| $R_{DS(ON)}$ | 0.85 $\Omega$ |
| $I_D$        | 8A            |



### Description

APEC MOSFET provide the power designer with the best combination of fast switching , lower on-resistance and reasonable cost.

The TO-220 and package is universally preferred for all commercial-industrial applications. The device is suited for switch mode power supplies ,DC-AC converters and high current high speed switching circuits.

### Absolute Maximum Ratings

| Symbol                | Parameter                                  | Rating     | Units         |
|-----------------------|--|------------|---------------|
| $V_{DS}$              | Drain-Source Voltage                       | 500        | V             |
| $V_{GS}$              | Gate-Source Voltage                        | $\pm 20$   | V             |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS}$ @ 10V   | 8          | A             |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V   | 5.1        | A             |
| $I_{DM}$              | Pulsed Drain Current <sup>1</sup>          | 32         | A             |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation                    | 125        | W             |
|                       | Linear Derating Factor                     | 1          | W/ $^\circ C$ |
| $E_{AS}$              | Single Pulse Avalanche Energy <sup>2</sup> | 320        | mJ            |
| $I_{AR}$              | Avalanche Current                          | 8          | A             |
| $T_{STG}$             | Storage Temperature Range                  | -55 to 150 | $^\circ C$    |
| $T_J$                 | Operating Junction Temperature Range       | -55 to 150 | $^\circ C$    |

### Thermal Data

| Symbol | Parameter                           | Value    | Unit         |
|--------|-------------------------------------|----------|--------------|
| Rthj-c | Thermal Resistance Junction-case    | Max. 1.0 | $^\circ C/W$ |
| Rthj-a | Thermal Resistance Junction-ambient | Max. 62  | $^\circ C/W$ |





**Electrical Characteristics @T<sub>j</sub>=25°C(unless otherwise specified)**

| Symbol              | Parameter  | Test Conditions  | Min. | Typ. | Max. | Units |
|---------------------|--|--|------|------|------|-------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                       | V <sub>GS</sub> =0V, I <sub>D</sub> =1mA                 | 500  | -    | -    | V     |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance                    | V <sub>GS</sub> =10V, I <sub>D</sub> =4.8A               | -    | -    | 0.85 | Ω     |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                               | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 2    | -    | 4    | V     |
| g <sub>fs</sub>     | Forward Transconductance                             | V <sub>DS</sub> =10V, I <sub>D</sub> =4.8A               | -    | 4.2  | -    | S     |
| I <sub>DSS</sub>    | Drain-Source Leakage Current (T <sub>j</sub> =25°C)  | V <sub>DS</sub> =500V, V <sub>GS</sub> =0V               | -    | -    | 25   | uA    |
|                     | Drain-Source Leakage Current (T <sub>j</sub> =125°C) | V <sub>DS</sub> =400V, V <sub>GS</sub> =0V               | -    | -    | 250  | uA    |
| I <sub>GSS</sub>    | Gate-Source Leakage                                  | V <sub>GS</sub> =±20V                                    | -    | -    | ±100 | nA    |
| Q <sub>g</sub>      | Total Gate Charge <sup>3</sup>                       | I <sub>D</sub> =8A                                       | -    | 45   | 72   | nC    |
| Q <sub>gs</sub>     | Gate-Source Charge                                   | V <sub>DS</sub> =400V                                    | -    | 7    | -    | nC    |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge                         | V <sub>GS</sub> =10V                                     | -    | 25   | -    | nC    |
| t <sub>d(on)</sub>  | Turn-on Delay Time <sup>3</sup>                      | V <sub>DD</sub> =250V                                    | -    | 12   | -    | ns    |
| t <sub>r</sub>      | Rise Time  | I <sub>D</sub> =8A                                       | -    | 31   | -    | ns    |
| t <sub>d(off)</sub> | Turn-off Delay Time                                  | R <sub>G</sub> =9.1 Ω, V <sub>GS</sub> =10V              | -    | 48   | -    | ns    |
| t <sub>f</sub>      | Fall Time  | R <sub>D</sub> =31 Ω                                     | -    | 33   | -    | ns    |
| C <sub>iss</sub>    | Input Capacitance                                    | V <sub>GS</sub> =0V                                      | -    | 1250 | 2000 | pF    |
| C <sub>oss</sub>    | Output Capacitance                                   | V <sub>DS</sub> =25V                                     | -    | 270  | -    | pF    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                         | f=1.0MHz   | -    | 85   | -    | pF    |
| R <sub>g</sub>      | Gate Resistance                                      | f=1.0MHz   | -    | 1.6  | 2.4  | Ω     |

**Source-Drain Diode**

| Symbol          | Parameter                          | Test Conditions   | Min. | Typ. | Max. | Units |
|-----------------|------------------------------------|---|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>3</sup>    | T <sub>j</sub> =25°C, I <sub>S</sub> =8A, V <sub>GS</sub> =0V | -    | -    | 1.5  | V     |
| t <sub>rr</sub> | Reverse Recovery Time <sup>3</sup> | I <sub>S</sub> =8A, V <sub>GS</sub> =0V,                      | -    | 515  | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge            | dI/dt=100A/μs   | -    | 8.6  | -    | uC    |

**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Starting T<sub>j</sub>=25°C , V<sub>DD</sub>=50V , L=10mH , R<sub>G</sub>=25 Ω
- 3.Pulse test

THIS PRODUCT IS ELECTROSTATIC SENSITIVE, PLEASE HANDLE WITH CAUTION.

THIS PRODUCT HAS BEEN QUALIFIED FOR USE IN CONSUMER APPLICATIONS. APPLICATIONS OR USE IN LIFE SUPPORT OR OTHER SIMILAR MISSION-CRITICAL DEVICES OR SYSTEMS ARE NOT AUTHORIZED.

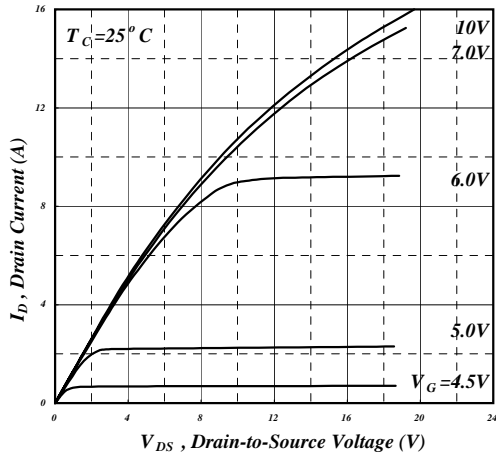


Fig 1. Typical Output Characteristics

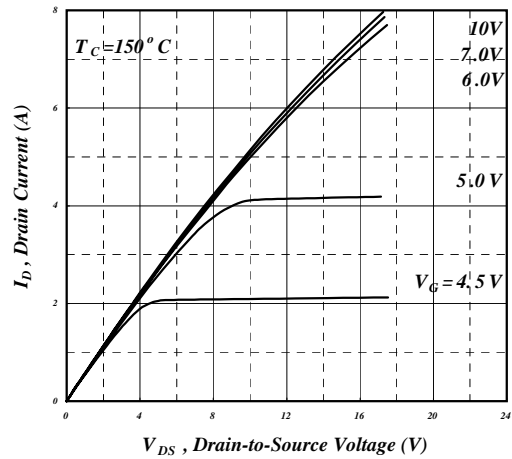


Fig 2. Typical Output Characteristics

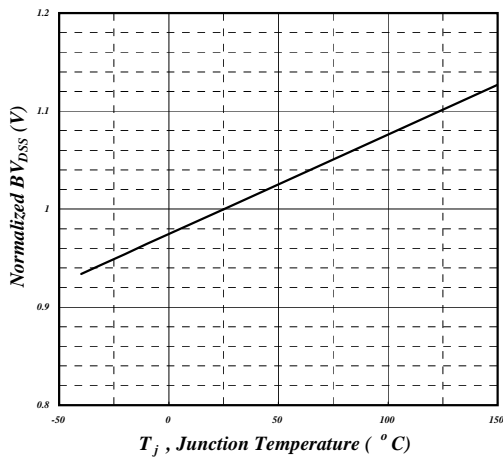


Fig 3. Normalized  $BV_{DSS}$  v.s. Junction Temperature

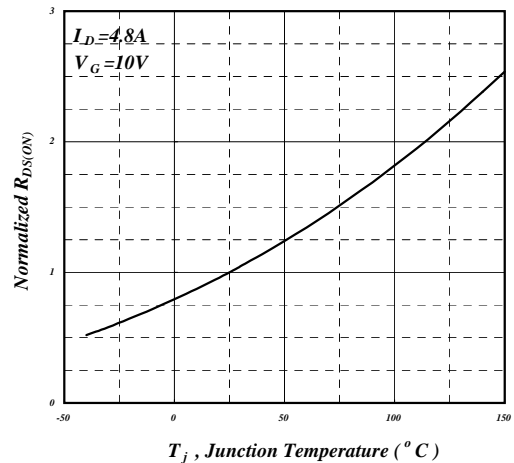


Fig 4. Normalized On-Resistance v.s. Junction Temperature

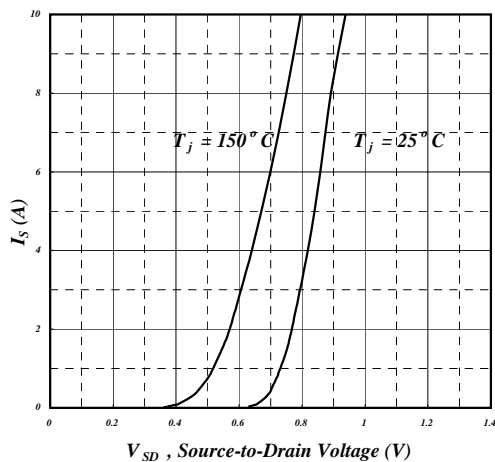


Fig 5. Forward Characteristic of Reverse Diode

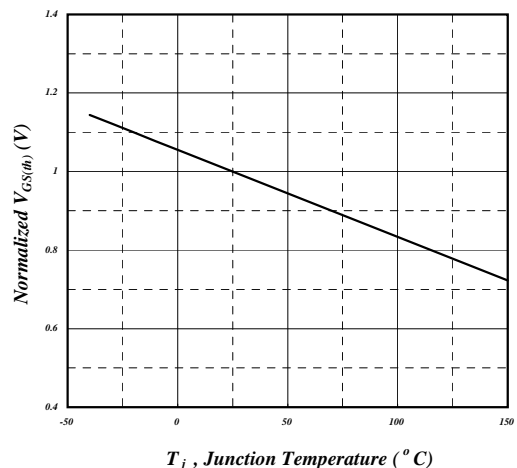


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

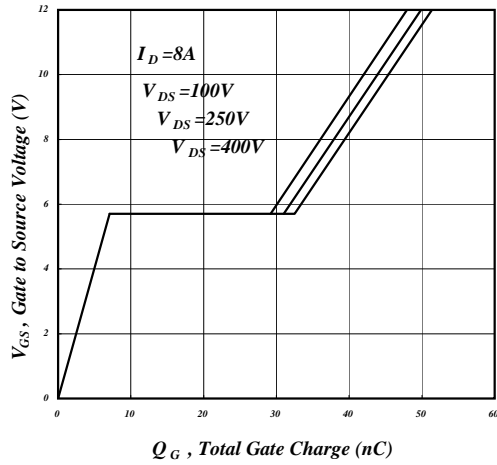


Fig 7. Gate Charge Characteristics

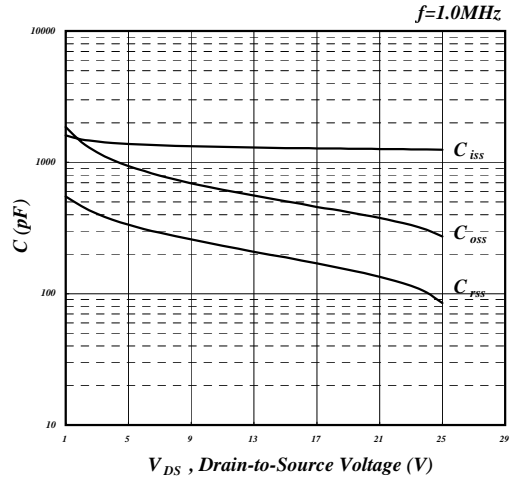


Fig 8. Typical Capacitance Characteristics

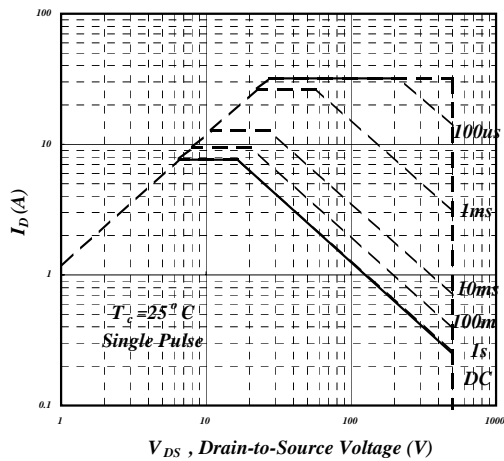


Fig 9. Maximum Safe Operating Area

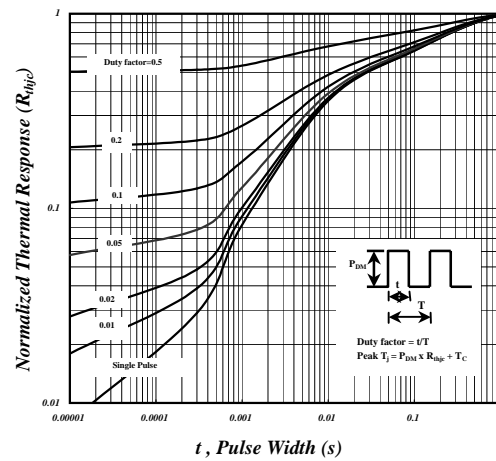


Fig 10. Effective Transient Thermal Impedance

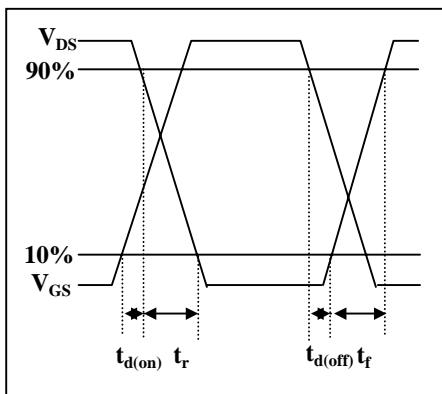


Fig 11. Switching Time Waveform

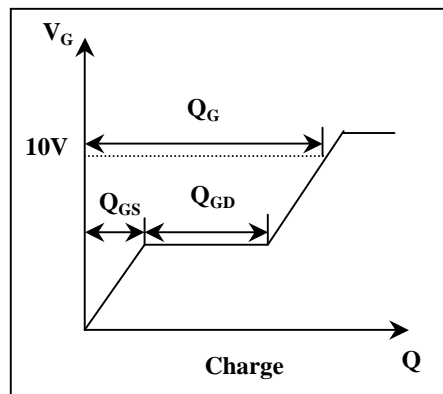


Fig 12. Gate Charge Waveform