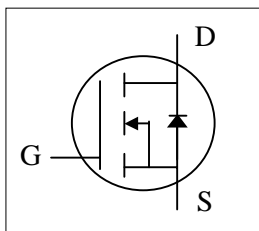




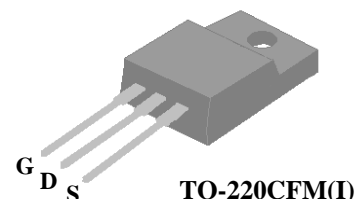
- ▼ Fast Switching Performance
- ▼ Single Drive Requirement
- ▼ Full Isolation Package



|              |              |
|--------------|--------------|
| $BV_{DSS}$   | 60V          |
| $R_{DS(ON)}$ | 36m $\Omega$ |
| $I_D$        | 23A          |

## Description

The Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.



The TO-220CFM isolation package is universally preferred for all commercial-industrial through hole applications.

## Absolute Maximum Ratings

| Symbol                    | Parameter                                | Rating     | Units         |
|---------------------------|--|------------|---------------|
| $V_{DS}$                  | Drain-Source Voltage                     | 60         | V             |
| $V_{GS}$                  | Gate-Source Voltage                      | $\pm 20$   | V             |
| $I_D @ T_C = 25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V$ | 23         | A             |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 14         | A             |
| $I_{DM}$                  | Pulsed Drain Current <sup>1</sup>        | 80         | A             |
| $P_D @ T_C = 25^\circ C$  | Total Power Dissipation                  | 31.3       | W             |
|                           | Linear Derating Factor                   | 0.25       | W/ $^\circ C$ |
| $T_{STG}$                 | Storage Temperature Range                | -55 to 150 | $^\circ C$    |
| $T_J$                     | Operating Junction Temperature Range     | -55 to 150 | $^\circ C$    |

## Thermal Data

| Symbol | Parameter                           | Value    | Units        |
|--------|-------------------------------------|----------|--------------|
| Rthj-c | Thermal Resistance Junction-case    | Max. 4.0 | $^\circ C/W$ |
| Rthj-a | Thermal Resistance Junction-ambient | Max. 65  | $^\circ C/W$ |



**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> =250uA               | 60   | -    | -    | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>j</sub> | Breakdown Voltage Temperature Coefficient            | Reference to 25°C, I <sub>D</sub> =1mA                   | -    | 0.05 | -    | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup>       | V <sub>GS</sub> =10V, I <sub>D</sub> =18A                | -    | -    | 36   | mΩ    |
|                                     |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =12A               | -    | -    | 50   | mΩ    |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                               | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 1    | -    | 3    | V     |
| g <sub>fs</sub>                     | Forward Transconductance                             | V <sub>DS</sub> =10V, I <sub>D</sub> =18A                | -    | 17   | -    | S     |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current (T <sub>j</sub> =25°C)  | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                | -    | -    | 10   | uA    |
|                                     | Drain-Source Leakage Current (T <sub>j</sub> =150°C) | V <sub>DS</sub> =48V, V <sub>GS</sub> =0V                | -    | -    | 25   | uA    |
| I <sub>GSS</sub>                    | Gate-Source Leakage                                  | V <sub>GS</sub> =±20V                                    | -    | -    | ±100 | nA    |
| Q <sub>g</sub>                      | Total Gate Charge <sup>2</sup>                       | I <sub>D</sub> =18A                                      | -    | 18   | 30   | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                                   | V <sub>DS</sub> =48V                                     | -    | 6    | -    | nC    |
| Q <sub>gd</sub>                     | Gate-Drain ("Miller") Charge                         | V <sub>GS</sub> =4.5V                                    | -    | 11   | -    | nC    |
| t <sub>d(on)</sub>                  | Turn-on Delay Time <sup>2</sup>                      | V <sub>DS</sub> =30V                                     | -    | 9    | -    | ns    |
| t <sub>r</sub>                      | Rise Time  | I <sub>D</sub> =18A                                      | -    | 24   | -    | ns    |
| t <sub>d(off)</sub>                 | Turn-off Delay Time                                  | R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =10V               | -    | 26   | -    | ns    |
| t <sub>f</sub>                      | Fall Time  | R <sub>D</sub> =1.67Ω                                    | -    | 7    | -    | ns    |
| C <sub>iss</sub>                    | Input Capacitance                                    | V <sub>GS</sub> =0V                                      | -    | 1700 | 2700 | pF    |
| C <sub>oss</sub>                    | Output Capacitance                                   | V <sub>DS</sub> =25V                                     | -    | 160  | -    | pF    |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                         | f=1.0MHz   | -    | 110  | -    | pF    |

**Source-Drain Diode**

| Symbol          | Parameter                          | Test Conditions                           | Min. | Typ. | Max. | Units |
|-----------------|------------------------------------|---|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup>    | I <sub>S</sub> =25A, V <sub>GS</sub> =0V  | -    | -    | 1.2  | V     |
| t <sub>rr</sub> | Reverse Recovery Time <sup>2</sup> | I <sub>S</sub> =18A, V <sub>GS</sub> =0V, | -    | 37   | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge            | dI/dt=100A/μs                             | -    | 38   | -    | nC    |

**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test

THIS PRODUCT IS AN ELECTROSTATIC SENSITIVE, PLEASE HANDLE WITH CAUTION.

THIS PRODUCT HAS BEEN QUALIFIED FOR CONSUMER MARKET. APPLICATIONS OR USES AS CRITERIAL COMPONENT IN LIFE SUPPORT DEVICE OR SYSTEM ARE NOT AUTHORIZED.

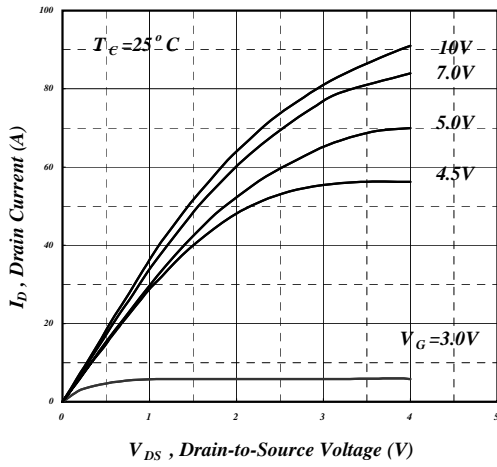


Fig 1. Typical Output Characteristics

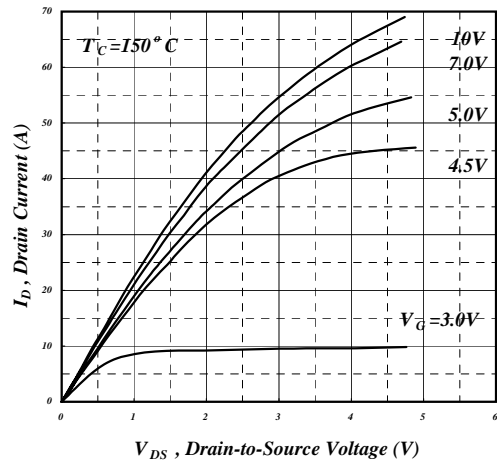


Fig 2. Typical Output Characteristics

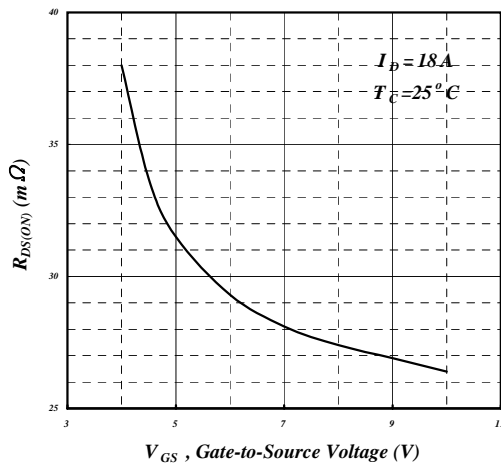


Fig 3. On-Resistance v.s. Gate Voltage

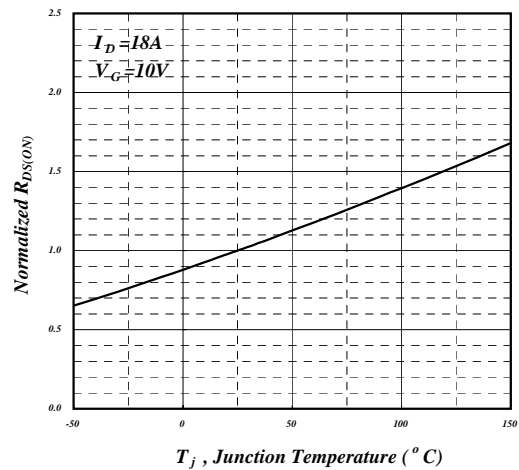


Fig 4. Normalized On-Resistance v.s. Junction Temperature

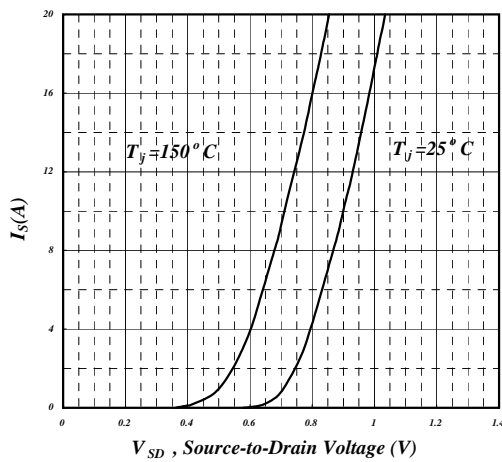


Fig 5. Forward Characteristic of Reverse Diode

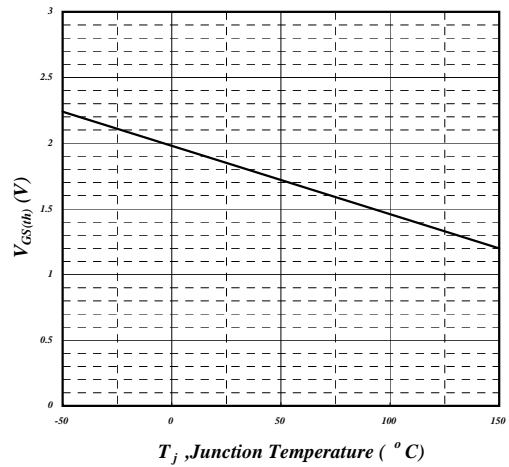


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

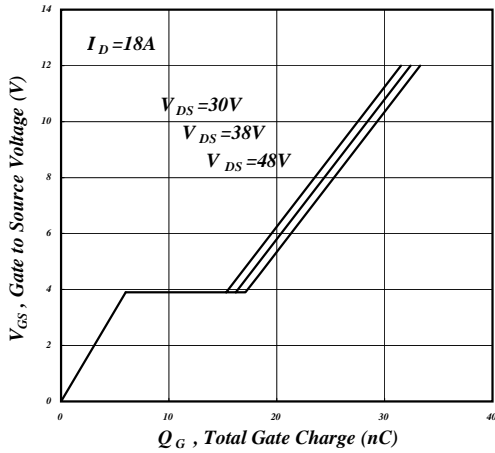


Fig 7. Gate Charge Characteristics

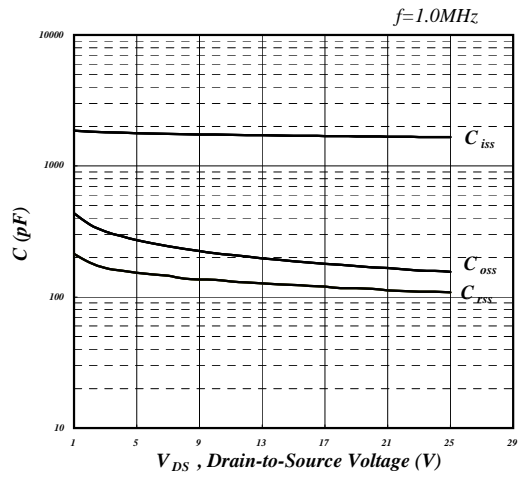


Fig 8. Typical Capacitance Characteristics

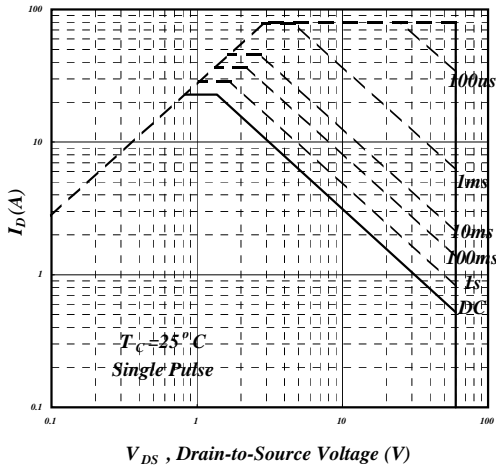


Fig 9. Maximum Safe Operating Area

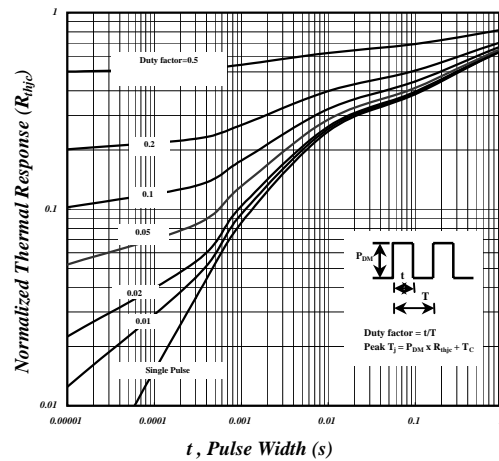


Fig 10. Effective Transient Thermal Impedance

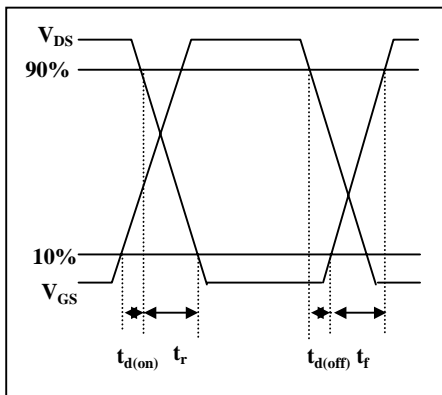


Fig 11. Switching Time Waveform

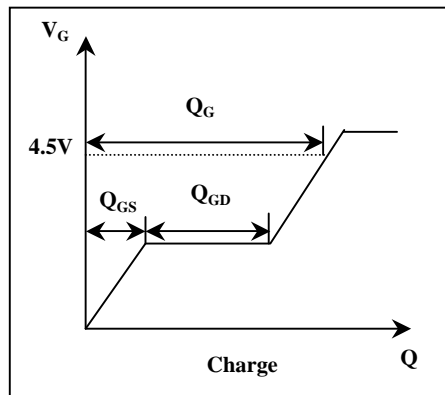
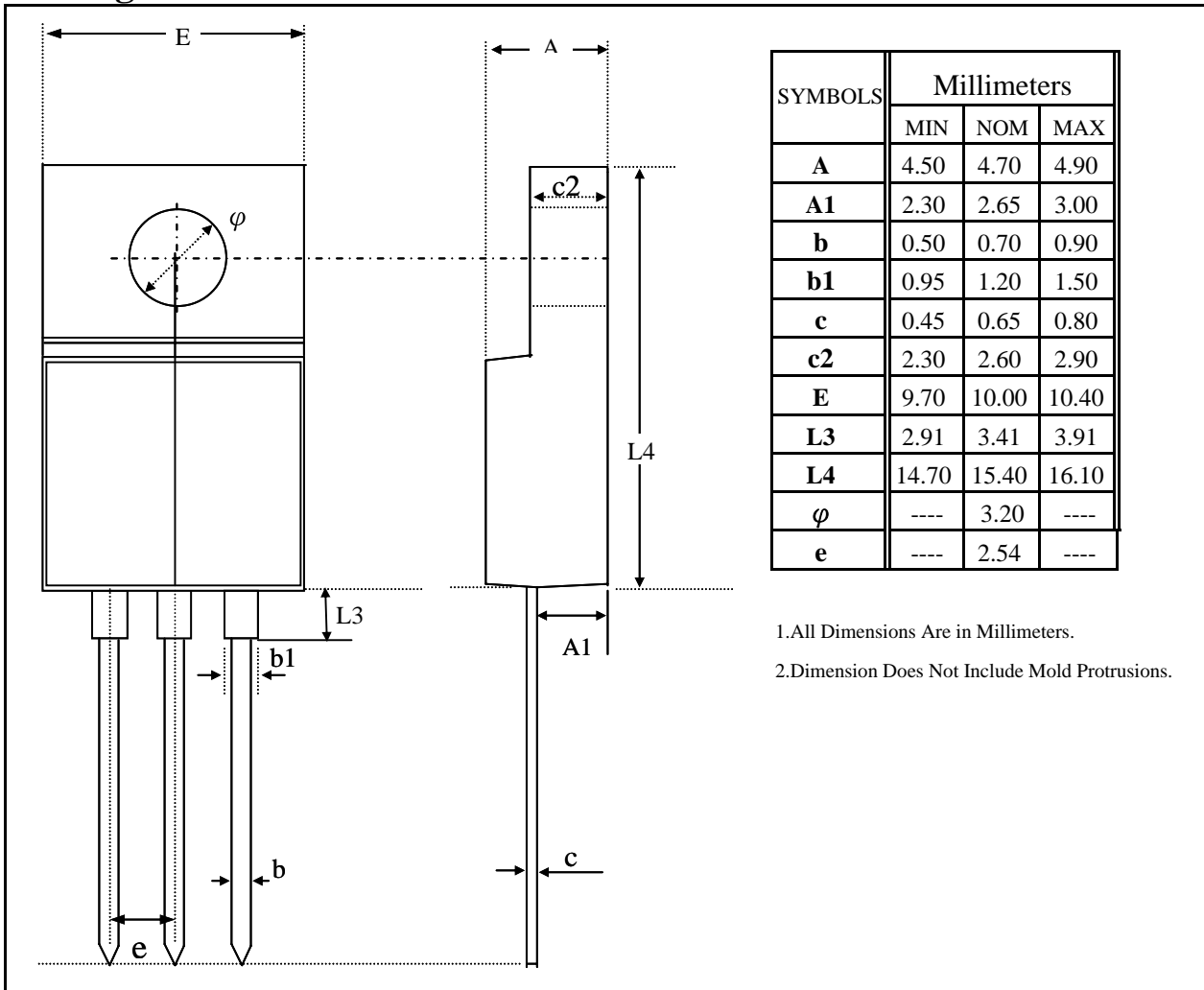


Fig 12. Gate Charge Waveform



## Package Outline : TO-220CFM



## Part Marking Information & Packing : TO-220CFM

