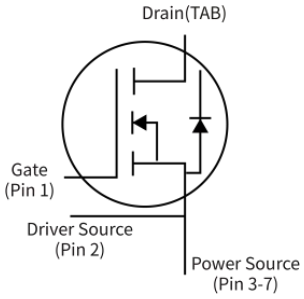
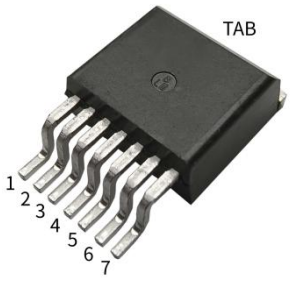
## Silicon Carbide Power MOSFET

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 1200 | V |
| $I_D$ | 60 | A |
| $R_{DS(ON)}$ | 45 | mΩ |
| $Q_G$ | 125 | nC |




TO-263-7L

### Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Low impedance package with driver source pin
- Easy to parallel and simple to drive

### Applications

- EV Charging
- High Voltage DC/DC Converters
- Switched-Mode Power Supply(SMPS)
- Power Factor Correction(PFC)

### Absolute Maximum Ratings (at $T_J$=25℃ unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source Voltage | $V_{DS}$ | 1200 | V |
| Gate-source Voltage | $V_{GS}$ | -10/+22 | V |
| Drain Current (continuous;Tc=25°C) | $I_D$ | 60 | A |
| Drain Current (continuous;Tc=100°C) | | 48 | |
| Drain Current (pulsed) | $I_{DM}$ | 100 | A |
| Power Dissipation (Tc=25°C) | $P_D$ | 325 | W |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | -55 to +175 | °C |
| Thermal Resistance from Junction to Case | $R_{\theta JC}$ | 0.46 | °C/W |
| Thermal Resistance From Junction to Ambient | $R_{\theta JA}$ | 40 | |

## Electrical Characteristics

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Static characteristics** (at $T_C$=25°C unless otherwise specified) | | | | | | |
| Drain-Source Breakdown Voltage | $B_{VDS}$ | $V_{GS}$=0V; $I_D$=250uA | 1200 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=1200V; $V_{GS}$=0V | - | - | 100 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=-10/+20V; $V_{DS}$=0V | - | 10 | 250 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$=$V_{DS}$; $I_{DS}$=10mA | 2 | 3 | 4 | V |
| Recommended Turn-on Voltage | $V_{GS(on)}$ | Static | - | 18 | - | V |
| Recommended Turn-off Voltage | $V_{GS(off)}$ | | - | -5 | - | V |
| Static Drain-Source on Resistance | $R_{DS(on)}$ | $V_{GS}$=18V; $I_D$=20A | - | 45 | 52 | mΩ |
| | | $V_{GS}$=18V; $I_D$=20A; $T_J$=175°C | - | 81 | - | |
| **Dynamic characteristics** (at $T_C$=25°C unless otherwise specified) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=1000V; f=1MHz; $V_{AC}$=25mV | - | 2565 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 109 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 4 | - | |
| Transconductance | $g_{fs}$ | $V_{DS}$=20V; $I_D$=20A | - | 24 | - | S |
| $C_{OSS}$ Stored Energy | $E_{OSS}$ | $V_{DS}$=1000V; f=1MHz | - | 63 | - | uJ |
| Turn-on Energy | $E_{on}$ | $V_{DS}$=800V; $V_{GS}$=-5/+18V; $I_D$=20A; $R_{g(ext)}$=2.5Ω; Load=100μH; $T_J$=175°C | - | 556 | - | uJ |
| Turn-off Energy | $E_{off}$ | | - | 93 | - | |
| Total Gate Charge | $Q_G$ | $V_{DS}$=800V; $V_{GS}$=-5/+18V; $I_D$=20A | - | 125 | - | nC |
| Gate-Source Charge | $Q_{GS}$ | | - | 32 | - | |
| Gate-Drain Charge | $Q_{GD}$ | | - | 33 | - | |
| Internal Gate Resistor | $R_{Gint}$ | f=1MHz; $V_{AC}$=25mV | - | 4.2 | - | Ω |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}$=800V; $V_{GS}$=-5/+18V; $I_D$=20A; $R_{g(ext)}$=2.5Ω; Load=100μH | - | 13 | - | ns |
| Rise Time | $t_r$ | | - | 17 | - | |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 23 | - | |
| Fall Time | $t_f$ | | - | 9 | - | |

## Reverse SiC Diode Characteristics(at $T_J$=25℃ unless otherwise specified)

| Parameter | Symbol | Conditions | Values | | | Units |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Diode Forward Voltage | $V_{FSD}$ | $V_{GS}$=0V; $I_F$=20A | - | 4.2 | 6 | V |
| | | $V_{GS}$=0V; $I_F$=20A; $T_J$=175°C | - | 3.5 | 6 | |
| Continuous Diode Forward Current | $I_S$ | $V_{GS}$=0V; $T_C$=25°C | - | 55 | - | A |
| Reverse Recovery Time | $t_{RR}$ | $V_R$=800V; $V_{GS}$=-5V; $I_F$=20A; di/dt=900A/μs; $T_J$=175°C | - | 50 | - | ns |
| Reverse Recovery Charge | $Q_{RR}$ | | - | 712 | - | nC |
| Peak Reverse Recovery Current | $I_{RRM}$ | | - | 19 | - | A |

## Typical Characteristics

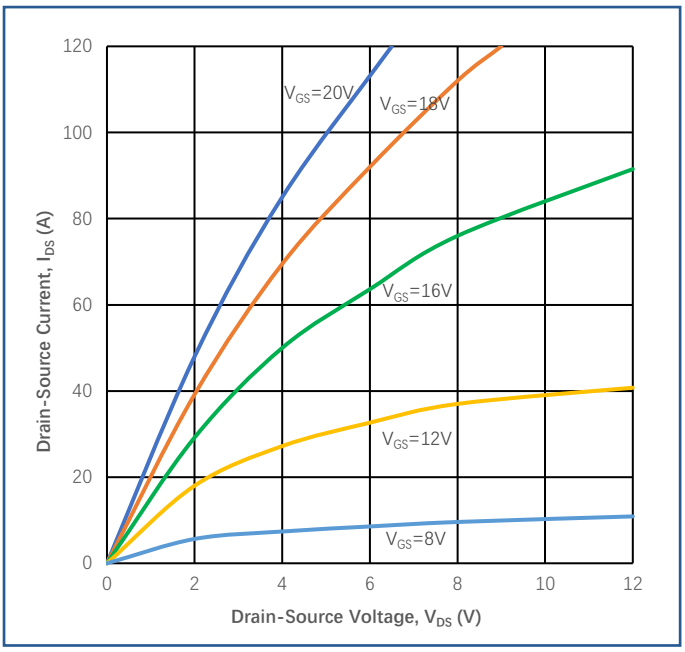



**Fig 1**

Output Characteristics ($T_J$=25°C)

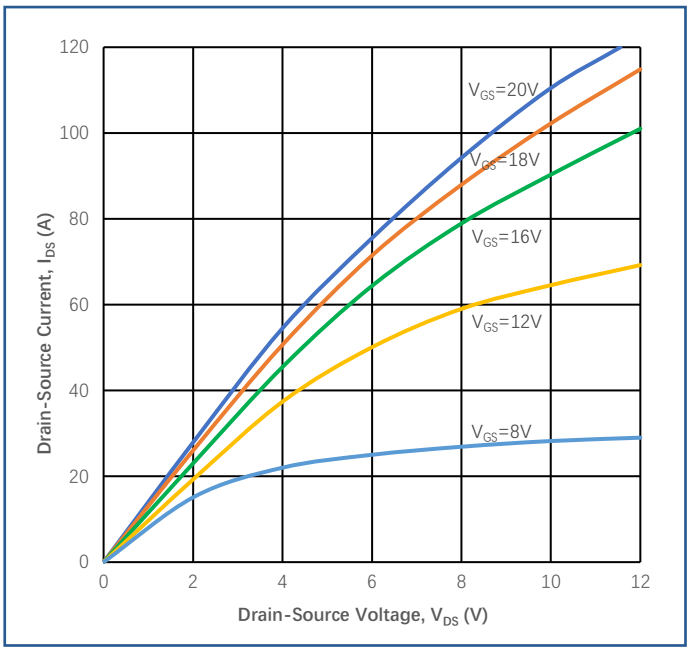



**Fig 2**

Output Characteristics ($T_J$=175°C)

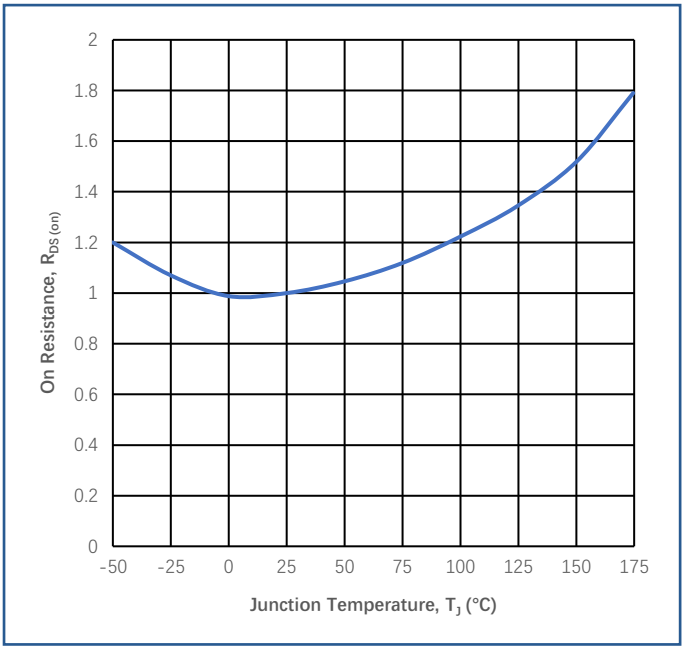



**Fig 3**

Normalized On-Resistance vs. Temperature

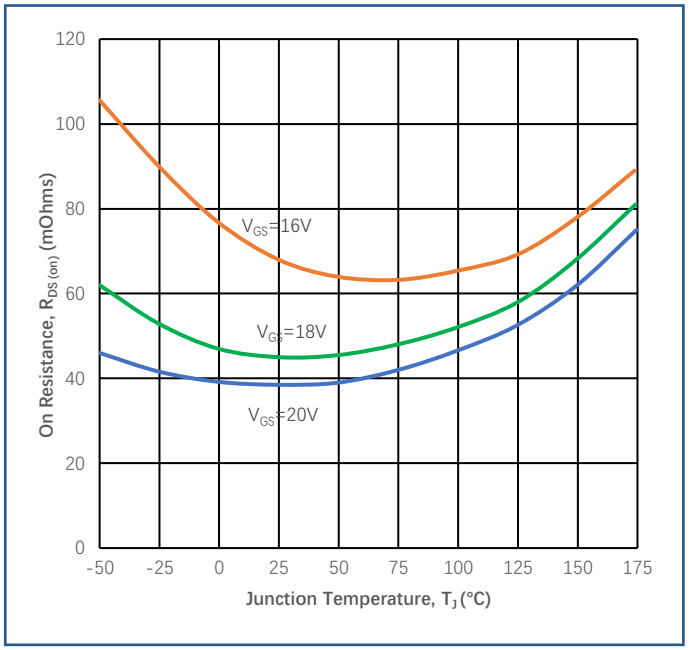



**Fig 4**

On-Resistance vs. Temperature

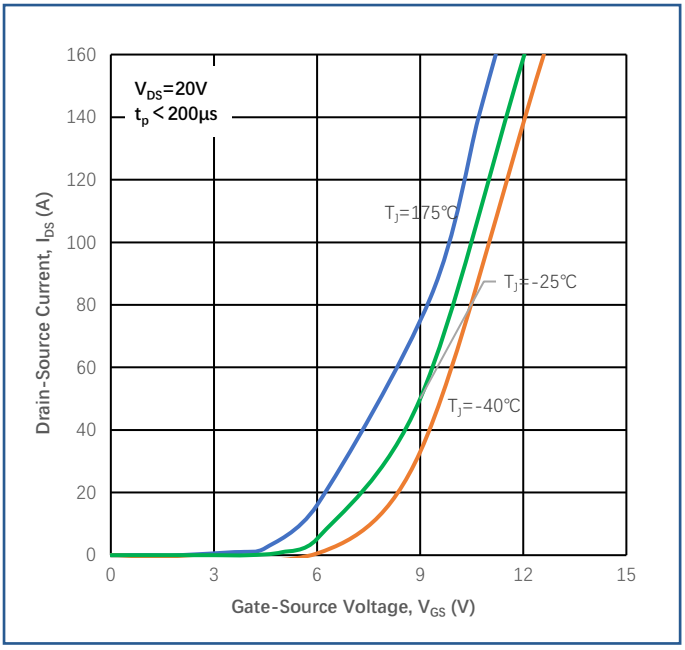



**Fig 5**

Transfer Characteristic

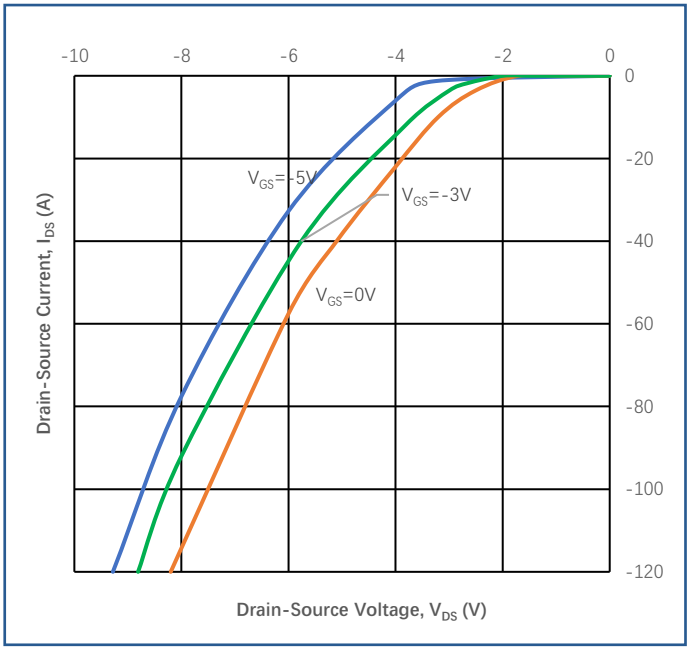



**Fig 6**

Body Diode Characteristic at 25°C

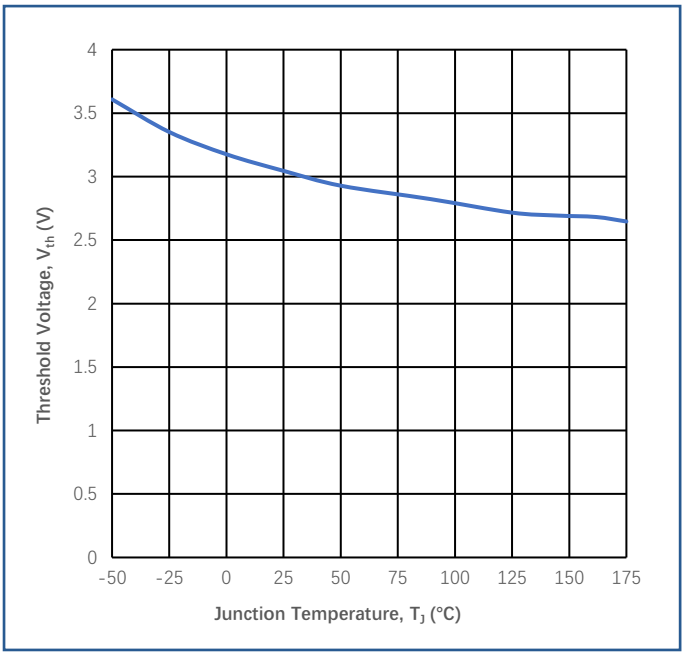



**Fig 7**

Threshold Voltage vs. Temperature

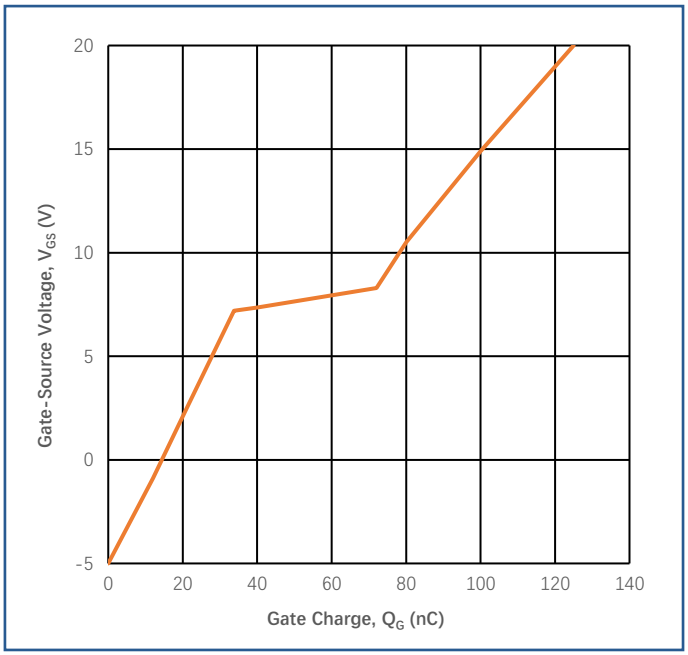



**Fig 8**

Gate Charge Characteristics

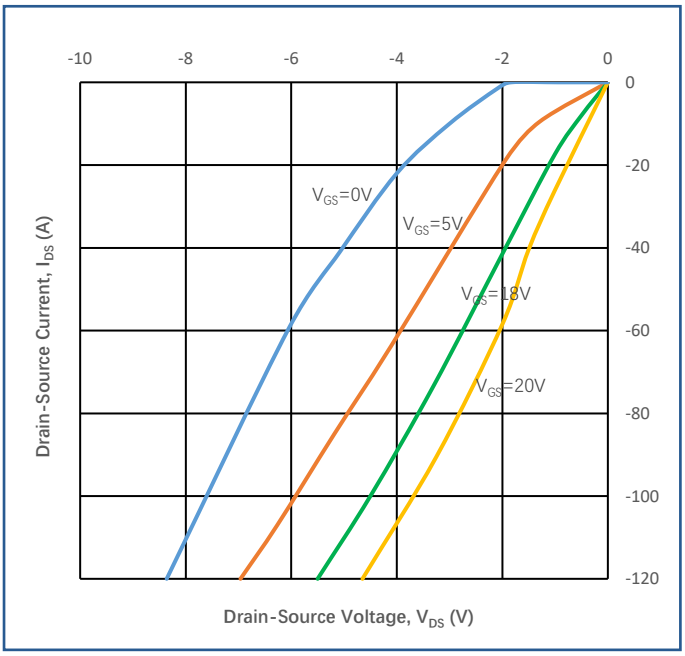



**Fig 9**

3rd Quadrant Characteristic at 25°C

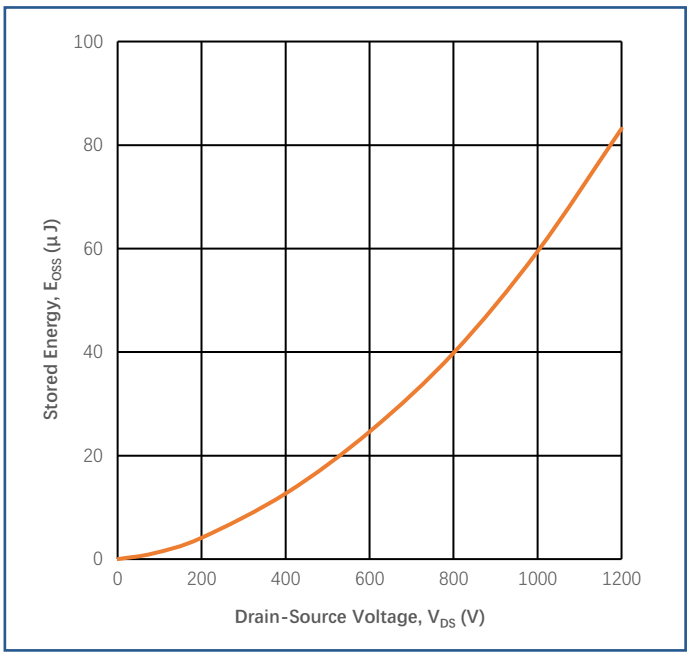



**Fig 10**

Output Capacitor Stored Energy

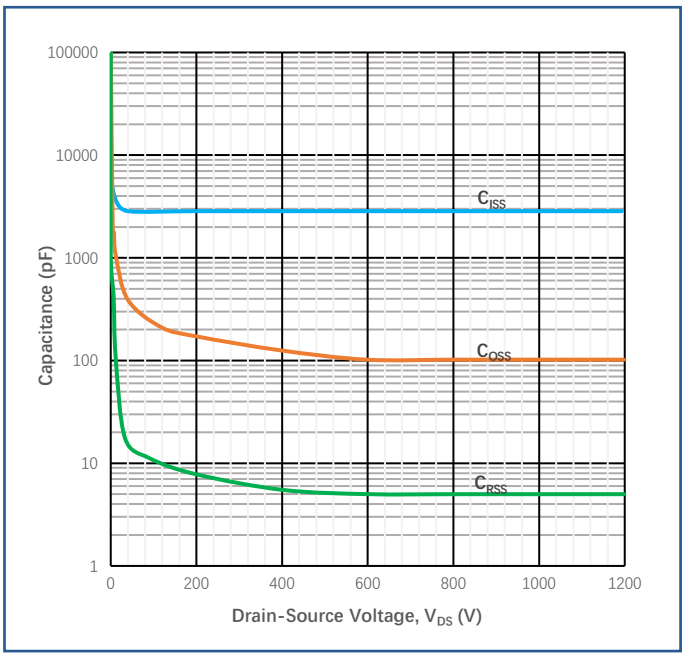



**Fig 11**

Capacitances vs. Drain-Source

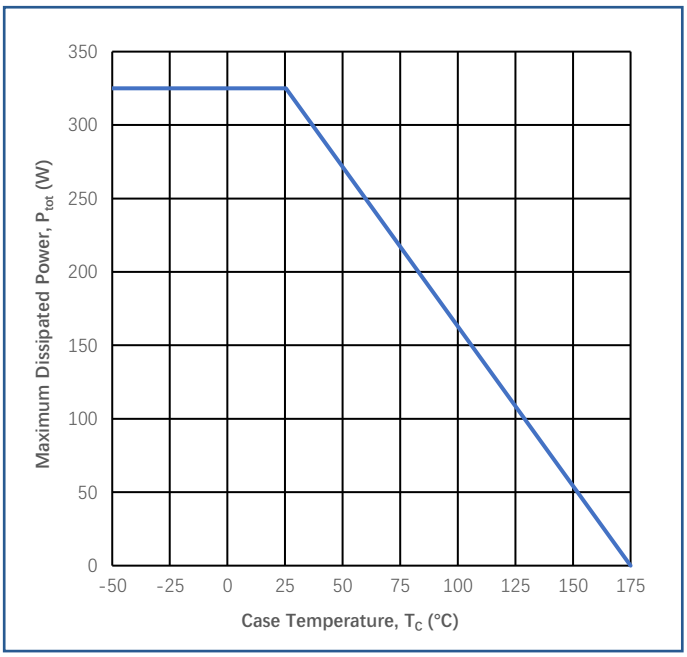



**Fig 12**

Max Power Dissipation Derating vs $T_C$

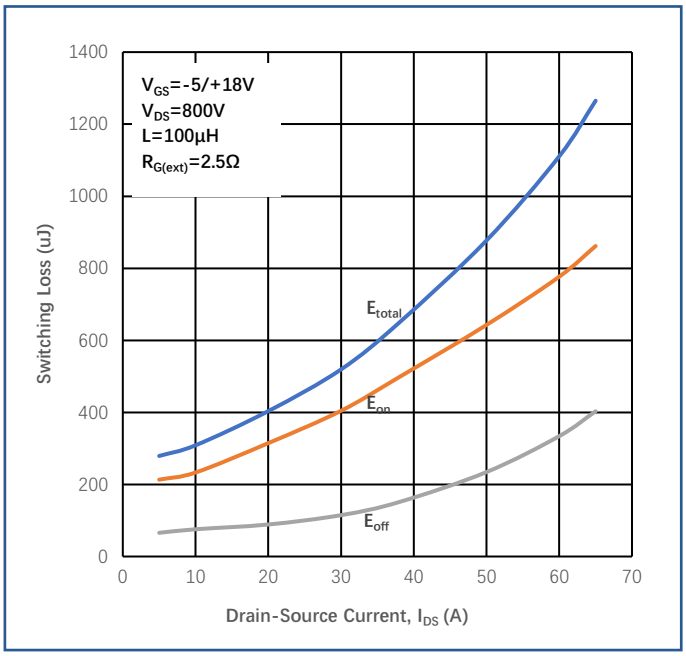



**Fig 13**

Switching Energy vs. Drain Current

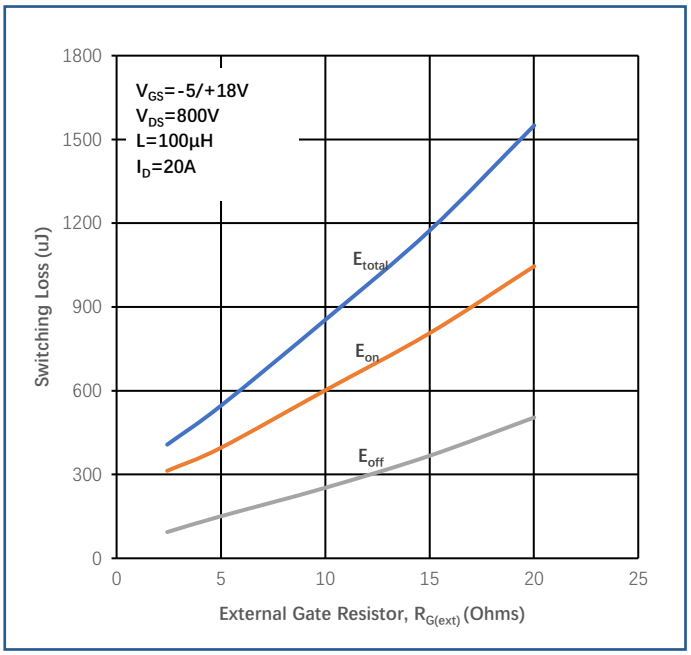



**Fig 14**

Switching Energy vs. $R_{G(ext)}$

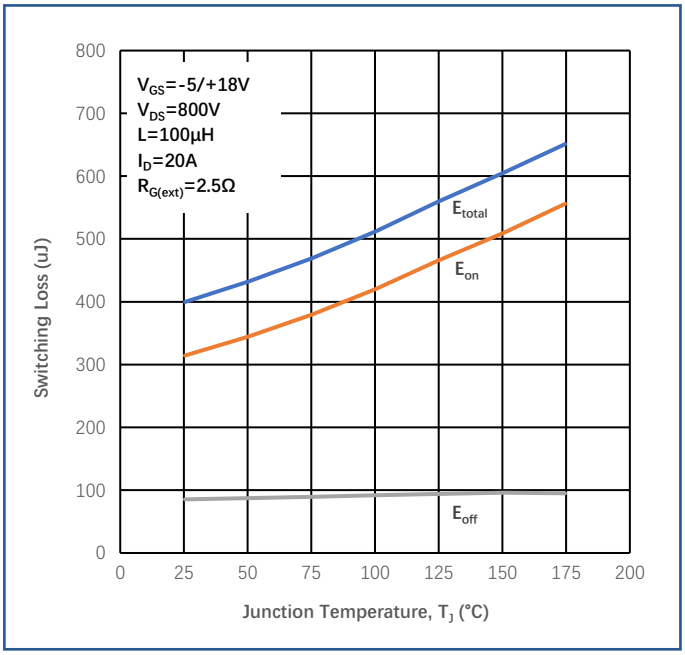



**Fig 15**

Switching Energy vs. Temperature

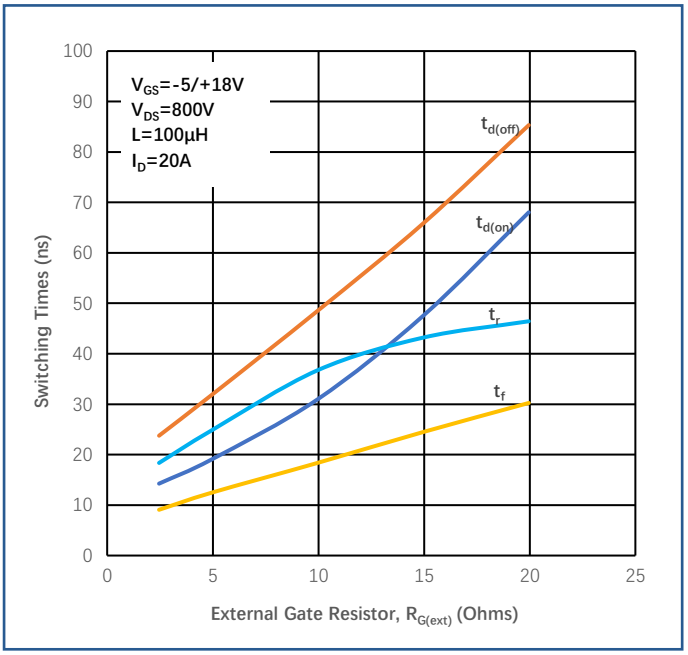



**Fig 16**

Switching Times vs. $R_{G(ext)}$

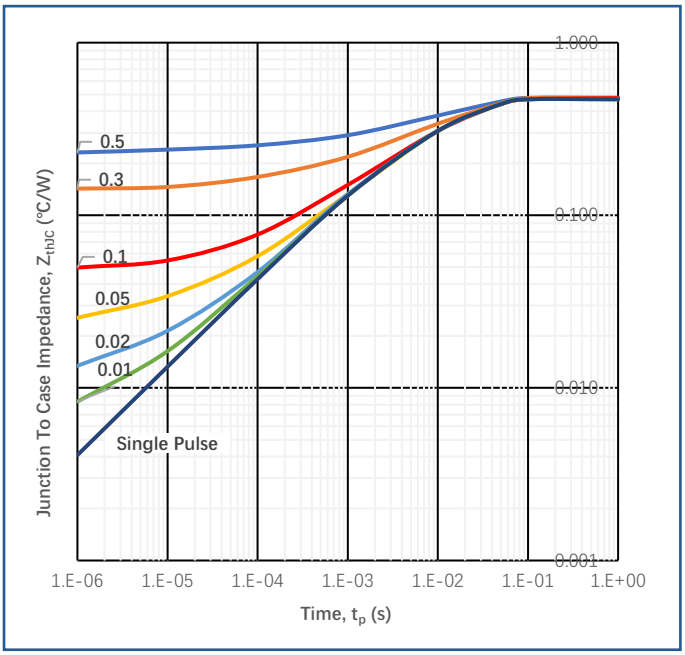



**Fig 17**

Transient Thermal Impedance

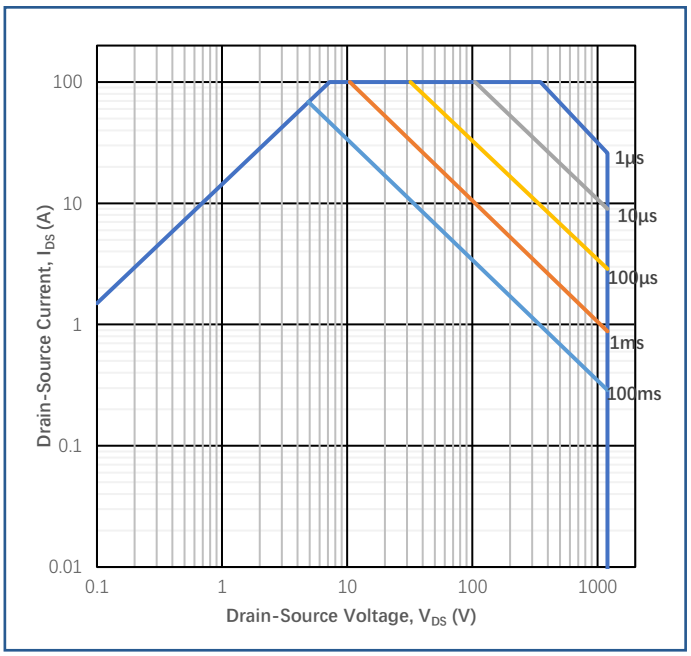
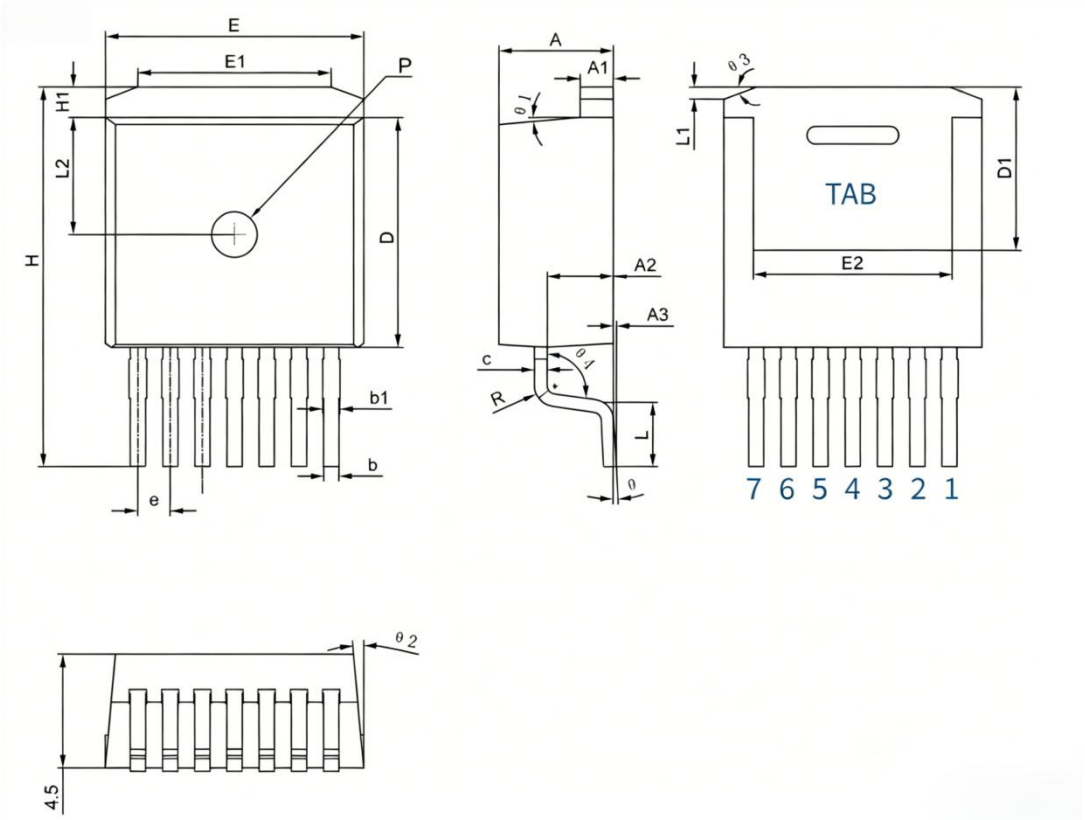



**Fig 18**

Safe Operating Area

## Package Outlines(Unit:mm)

### TO-263-7L




| Symbol | Millimeters | | | Symbol | Millimeters | | |
|---|---|---|---|---|---|---|---|
| | Min. | Type. | Max. | | Min. | Type. | Max. |
| **A** | 4.40 | 4.50 | 4.60 | **e** | 1.17 | 1.27 | 1.37 |
| **A1** | 1.25 | 1.30 | 1.40 | **H** | 14.75 | 15.00 | 15.25 |
| **A2** | 2.45 | 2.60 | 2.70 | **H1** | 1.10 | 1.20 | 1.30 |
| **A3** | 0.05 | 0.13 | 0.20 | **L** | 2.35 | 2.55 | 2.75 |
| **b** | 0.50 | 0.60 | 0.70 | **L1** | 0.37 | 0.57 | 0.77 |
| **b1** | 0.60 | 0.70 | 0.85 | **L2** | 4.48 | 4.63 | 4.78 |
| **c** | 0.45 | 0.50 | 0.60 | **θ** | 0° | 3° | 5° |
| **D** | 8.88 | 9.08 | 9.28 | **θ1** | 3° | 5° | 7° |
| **D1** | 6.25 | 6.45 | 6.65 | **θ2** | 3° | 5° | 7° |
| **E** | 9.88 | 10.18 | 10.28 | **θ3** | 15° | 20° | 25° |
| **E1** | 6.67 | 7.07 | 7.47 | **R** | 0.75 | 0.80 | 0.85 |
| **E2** | 7.67 | 7.82 | 7.97 | **P** | 1.70 | 1.80 | 1.90 |

| Pin | Symbol | Description |
|---|---|---|
| 1 | G | Gate |
| 2 | KS | Driver Source |
| 3-7 | S | Power Source |
| TAB | D | Drain |

**Note:**

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

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