

4V Drive Pch MOSFET

RP1E090RP

● Structure

Silicon P-channel MOSFET

● Features

- 1) Low on-resistance.
- 2) Built-in G-S Protection Diode.
- 3) Small Surface Mount Package (MPT6).

● Application

Switching

● Packaging specifications

| Type | Package | Taping |
|-----------|------------------------------|--------|
| | Code | TR |
| | Basic ordering unit (pieces) | 1000 |
| RP1E090RP | | ○ |

● Absolute maximum ratings (Ta = 25°C)

| Parameter | Symbol | Limits | Unit | |
|------------------------------|------------|---------------|------|---|
| Drain-source voltage | V_{DSS} | -30 | V | |
| Gate-source voltage | V_{GSS} | ±20 | V | |
| Drain current | Continuous | I_D | ±9 | A |
| | Pulsed | I_{DP}^{*1} | ±36 | A |
| Source current (Body Diode) | Continuous | I_S | -1.6 | A |
| | Pulsed | I_{SP}^{*1} | -36 | A |
| Power dissipation | P_D^{*2} | 2.0 | W | |
| Channel temperature | Tch | 150 | °C | |
| Range of storage temperature | Tstg | -55 to +150 | °C | |

*1 $P_w \leq 10 \mu s$, Duty cycle $\leq 1\%$

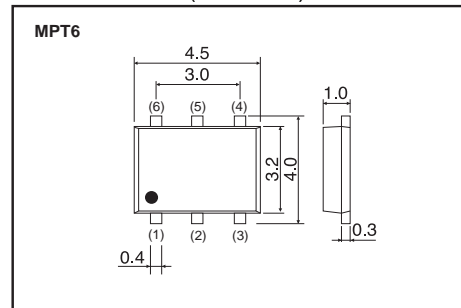
*2 Mounted on a ceramic board.

● Thermal resistance

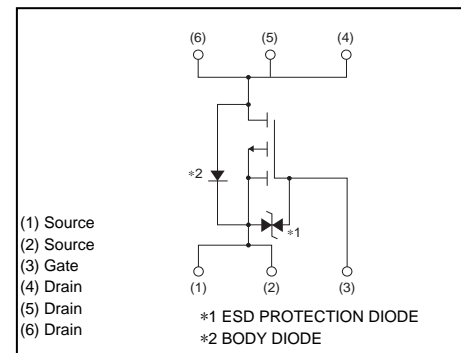
| Parameter | Symbol | Limits | Unit |
|--------------------|------------------|--------|--------|
| Channel to Ambient | $R_{th}(ch-a)^*$ | 62.5 | °C / W |

*Mounted on a ceramic board.

● Dimensions (Unit : mm)



● Inner circuit



● **Electrical characteristics** (Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|----------------|------|------|------|------|-----------------------------|
| Gate-source leakage | I_{GSS} | - | - | ±10 | μA | $V_{GS}=\pm 20V, V_{DS}=0V$ |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | -30 | - | - | V | $I_D=-1mA, V_{GS}=0V$ |
| Zero gate voltage drain current | I_{DSS} | - | - | -1 | μA | $V_{DS}=-30V, V_{GS}=0V$ |
| Gate threshold voltage | $V_{GS(th)}$ | -1.0 | - | -2.5 | V | $V_{DS}=-10V, I_D=-1mA$ |
| Static drain-source on-state resistance | $R_{DS(on)}^*$ | - | 13 | 16.9 | mΩ | $I_D=-9A, V_{GS}=-10V$ |
| | | - | 18 | 25.2 | | $I_D=-9A, V_{GS}=-4.5V$ |
| | | - | 21 | 29.4 | | $I_D=-9A, V_{GS}=-4.0V$ |
| Forward transfer admittance | $ Y_{fs} ^*$ | 10 | - | - | S | $I_D=-9A, V_{DS}=-10V$ |
| Input capacitance | C_{iss} | - | 3000 | - | pF | $V_{DS}=-10V$ |
| Output capacitance | C_{oss} | - | 360 | - | pF | $V_{GS}=0V$ |
| Reverse transfer capacitance | C_{rss} | - | 360 | - | pF | $f=1MHz$ |
| Turn-on delay time | $t_{d(on)}^*$ | - | 20 | - | ns | $I_D=-4.5A, V_{DD}^*=-15V$ |
| Rise time | t_r^* | - | 30 | - | ns | $V_{GS}=-10V$ |
| Turn-off delay time | $t_{d(off)}^*$ | - | 135 | - | ns | $R_L=3.3\Omega$ |
| Fall time | t_f^* | - | 80 | - | ns | $R_G=10\Omega$ |
| Total gate charge | Q_g^* | - | 30 | - | nC | $I_D=-9A$ |
| Gate-source charge | Q_{gs}^* | - | 7 | - | nC | $V_{DD}^*=-15V$ |
| Gate-drain charge | Q_{gd}^* | - | 11 | - | nC | $V_{GS}=-5V$ |

*Pulsed

● **Body diode characteristics** (Source-Drain) (Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-----------------|------------|------|------|------|------|----------------------|
| Forward Voltage | V_{SD}^* | - | - | -1.2 | V | $I_s=-9A, V_{GS}=0V$ |

*Pulsed

● Electrical characteristic curves

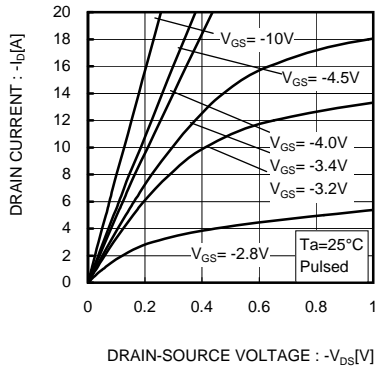


Fig.1 Typical output characteristics(I)

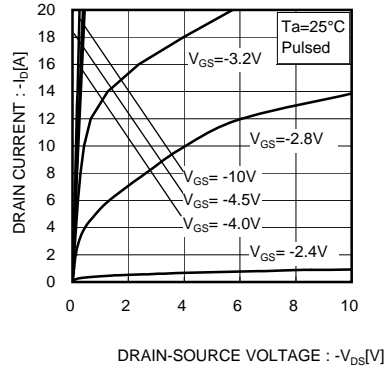


Fig.2 Typical output characteristics(II)

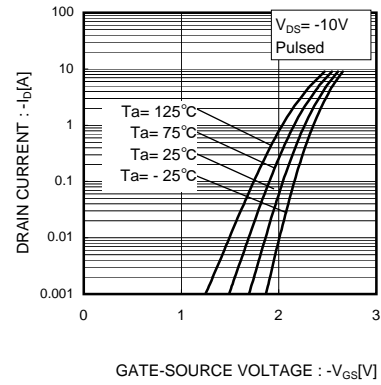


Fig.3 Typical Transfer Characteristics

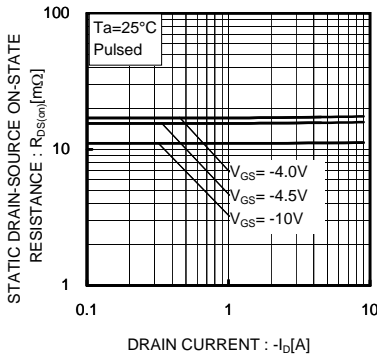


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (I)

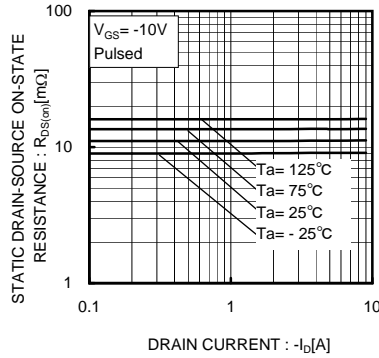


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current (II)

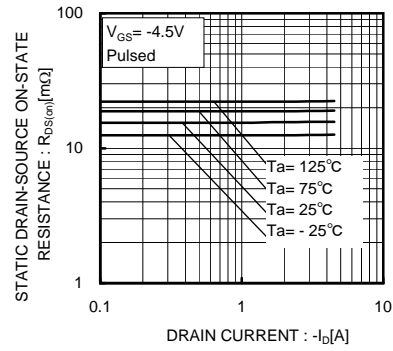


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(III)

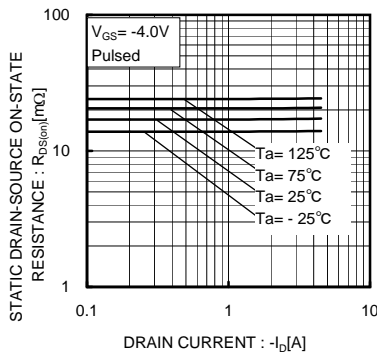


Fig.7 Static Drain-Source On-State Resistance vs. Drain

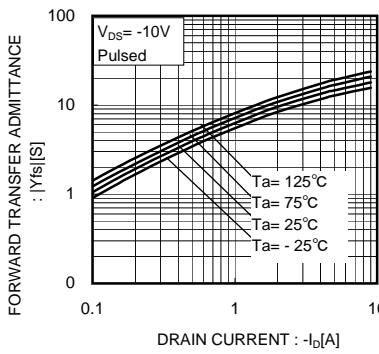


Fig.8 Forward Transfer Admittance vs. Drain Current

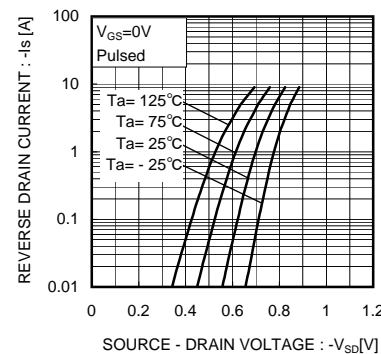


Fig.9 Reverse Drain Current vs. Source-Drain Voltage

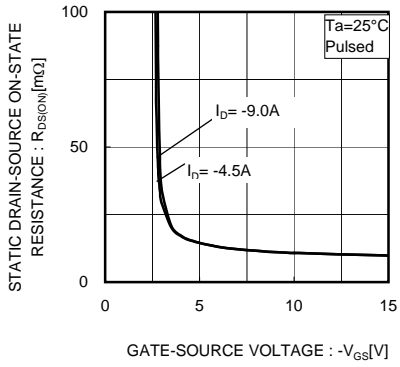


Fig.10 Static Drain-Source On-State Resistance vs. Gate Source Voltage

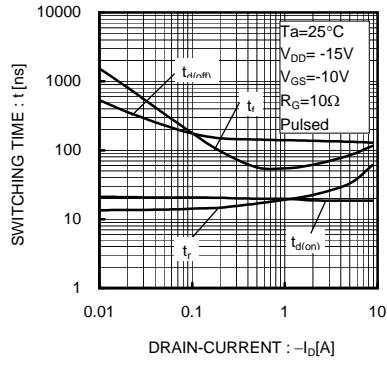


Fig.11 Switching Characteristics

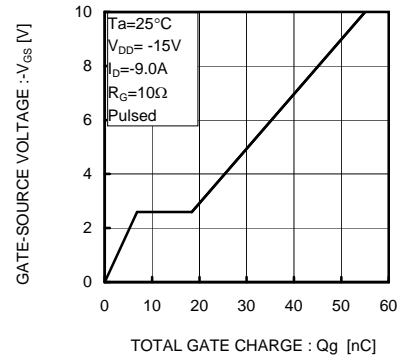


Fig.12 Dynamic Input Characteristics

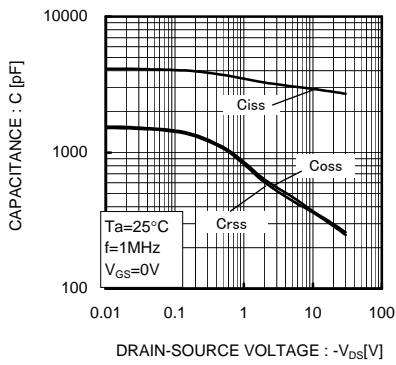


Fig.13 Typical Capacitance vs. Drain-Source Voltage

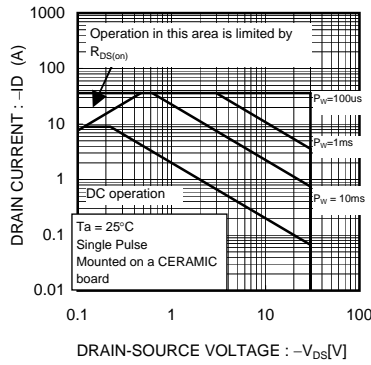


Fig.14 Maximum Safe Operating Area

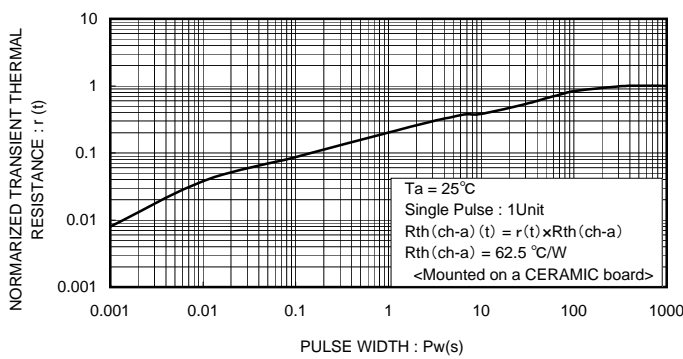


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width

● Measurement circuits

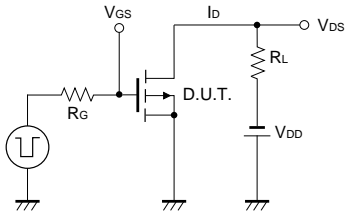


Fig.1-1 Switching Time Measurement Circuit

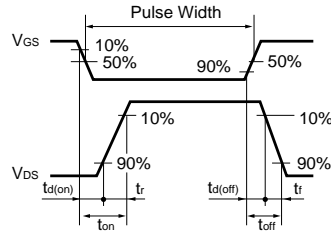


Fig.1-2 Switching Waveforms

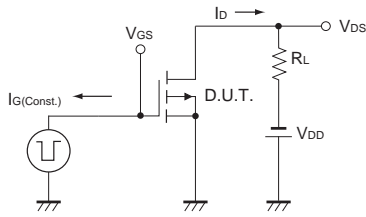


Fig.2-1 Gate charge measurement circuit

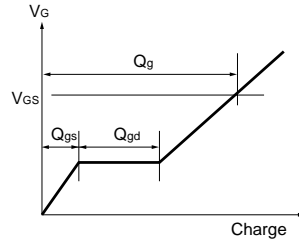


Fig.2-2 Gate Charge Waveform

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