

## FEATURES

$V_{DS} = -30V, I_D = -12A$

$R_{DS(ON)} < 15m\Omega @ V_{GS} = -10V$

$R_{DS(ON)} < 20m\Omega @ V_{GS} = -4.5V$

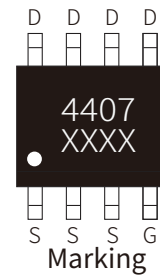
High power and current handling capability

Lead free product is acquired

Surface mount package



SOP-8



Marking

## APPLICATION

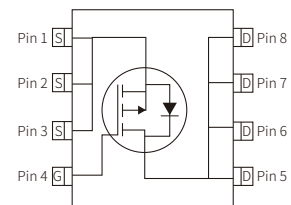
PWM applications

Load switch

## APPROVALS

**RoHS** Compliance with 2011/65/EU

**HF** Compliance with IEC61249-2-21:2003



Schematic Symbol

## ABSOLUTE MAXIMUM RATINGS

| Parameter                                   | Symbol          | Value      | Unit         |
|---------------------------------------------|-----------------|------------|--------------|
| Drain-Source Voltage                        | $V_{DS}$        | -30        | V            |
| Drain Current ( $T_C = 25^\circ C$ )        | $I_D$           | -12        | A            |
| Drain Current ( $T_C = 100^\circ C$ )       | $I_D$           | -9         | A            |
| Drain Current - Pulsed                      | $I_{DM}$        | -42        | A            |
| Gate-Source Voltage                         | $V_{GS}$        | $\pm 20$   | V            |
| Power Dissipation ( $T_C = 25^\circ C$ )    | $P_{tot}$       | 3          | W            |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 41.7       | $^\circ C/W$ |
| Junction and Storage Temperature Range      | $T_J, T_{STG}$  | -55 to 150 | $^\circ C$   |

## ELECTRICAL CHARACTERISTICS (Ta=25°C )

| Parameter                                     | Symbol       | Test Conditions                                                                 | Min  | Typ   | Max       | Unit       |
|-----------------------------------------------|--------------|---------------------------------------------------------------------------------|------|-------|-----------|------------|
| OFF Characteristics                           |              |                                                                                 |      |       |           |            |
| Drain-source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$                                                      | -30  |       |           | V          |
| Gate-body leakage                             | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                                     |      |       | $\pm 100$ | nA         |
| Zero gate voltage drain current               | $I_{DSS}$    | $V_{DS}=-24V, V_{GS}=0V$                                                        |      |       | -1        | $\mu A$    |
| Gate Threshold Voltage                        | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$                                                  | -1.0 | -1.5  | -2.2      | V          |
| Forward Trans conductance                     | $g_{FS}$     | $V_{DS}=-5V, I_D=-10A$                                                          | 25   |       |           | S          |
| Drain-source on-state resistance              | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-10A$                                                         |      | 9     | 15        | m $\Omega$ |
|                                               |              | $V_{GS}=-4.5V, I_D=-8A$                                                         |      | 13    | 20        | m $\Omega$ |
| Dynamic characteristics                       |              |                                                                                 |      |       |           |            |
| Input capacitance                             | $C_{iss}$    | $V_{DS}=-15V, V_{GS}=0V, f=1MHz$                                                |      | 2885  |           | pF         |
| Output capacitance                            | $C_{oss}$    |                                                                                 |      | 341   |           | pF         |
| Reverse transfer capacitance                  | $C_{rss}$    |                                                                                 |      | 305   |           | pF         |
| Turn-on delay time                            | $t_{d(on)}$  | $V_{DD}=-15V, I_D=-10A$<br>$V_{GEN}=-10V, R_L=1.25\Omega,$<br>$R_{GEN}=3\Omega$ |      | 16    |           | ns         |
| Turn-on Rise Time                             | $t_r$        |                                                                                 |      | 12    |           | ns         |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                                                 |      | 45    |           | ns         |
| Turn-off Fall yime                            | $t_f$        |                                                                                 |      | 21    |           | ns         |
| Total Gate Charge                             | $Q_g$        | $V_{DS}=-15V, I_D=-8A$<br>$V_{GS}=-10V$                                         |      | 48    |           | nC         |
| Gate-Source Charge                            | $Q_{gs}$     |                                                                                 |      | 12    |           | nC         |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                                                 |      | 14    |           | nC         |
| Drain-source Diode Characteristics            |              |                                                                                 |      |       |           |            |
| Diode Forward voltage                         | $V_{SD}$     | $V_{GS}=0V, I_S=-2A$                                                            |      | -0.81 | -1.2      | V          |
| Continuous drain-source diode forward current | $I_S$        |                                                                                 |      |       | -11       | A          |
| Pulsed drain-source diode forward current     | $I_{SM}$     |                                                                                 |      |       | -42       | A          |

# PARAMETER CHARACTERISTIC CURVE

Figure 1: Output Characteristics

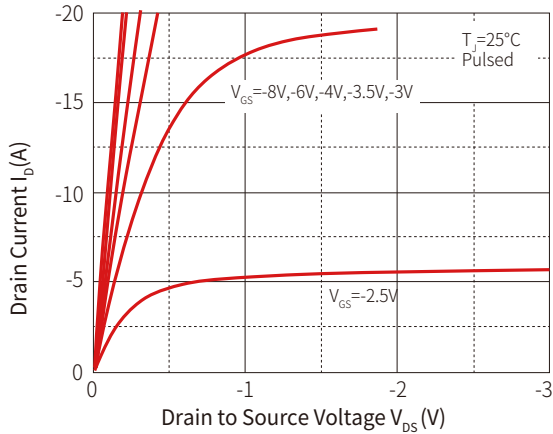


Figure 2: Transfer Characteristics

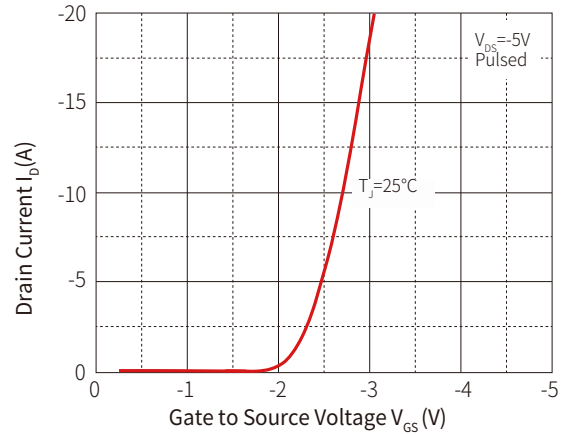


Figure 3:  $R_{DS(ON)}$  —  $I_D$

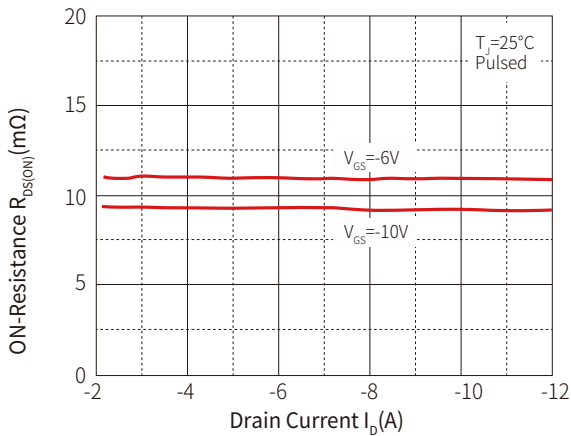


Figure 4:  $R_{DS(ON)}$  —  $V_{GS}$

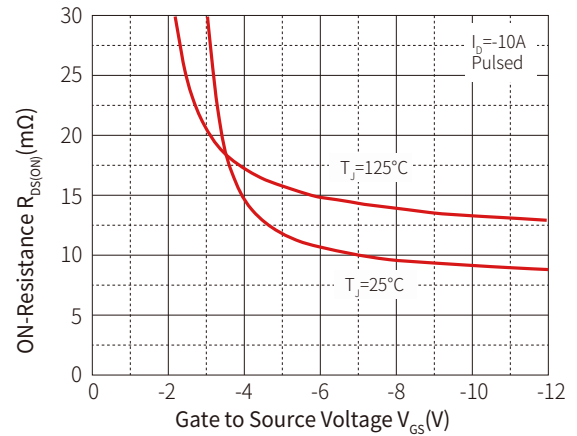


Figure 5:  $I_S$  —  $V_{SD}$

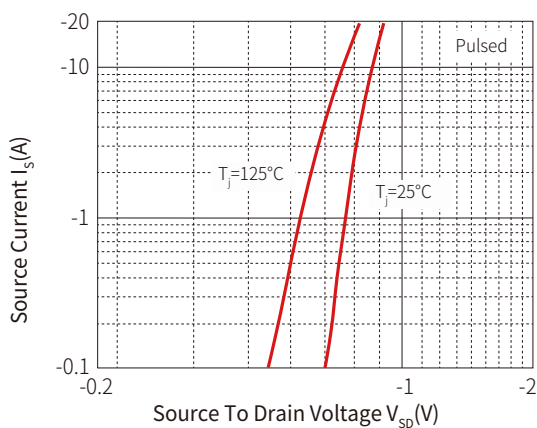
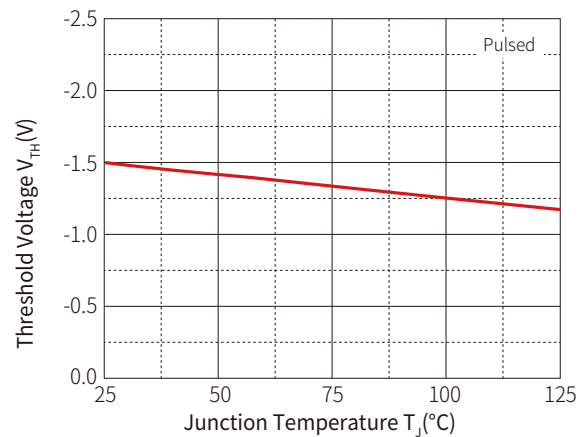
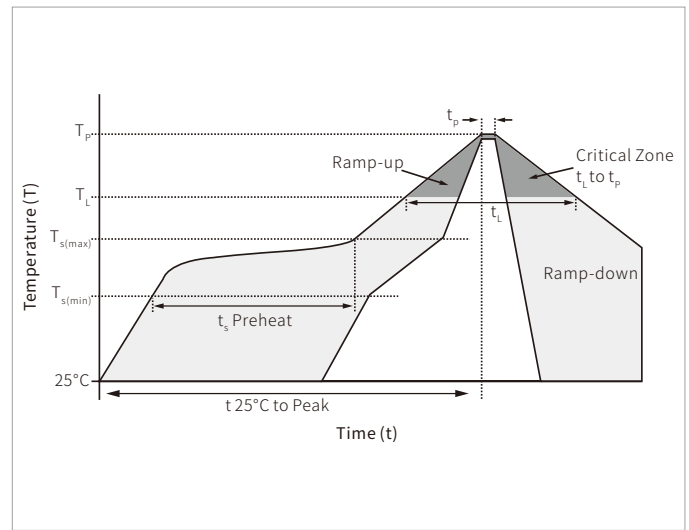


Figure 6: Threshold Voltage

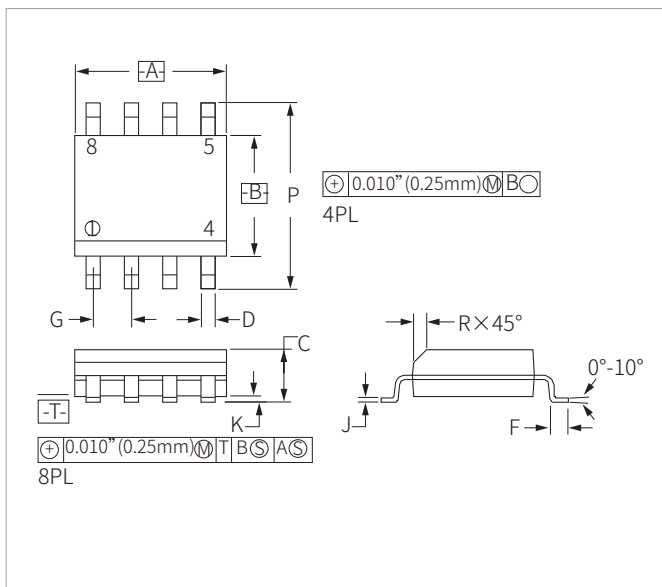


## SOLDERING PARAMETERS

| Reflow Condition                                       |                                  | Lead-free assembly |
|--------------------------------------------------------|----------------------------------|--------------------|
| Pre Heat                                               | Temperature Max ( $T_{s(min)}$ ) | 150°C              |
|                                                        | Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|                                                        | Time (min to max) ( $t_s$ )      | 60 – 180 secs      |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                  | 3°C/second max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                  | 3°C/second max     |
| Reflow                                                 | Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|                                                        | Time (min to max) ( $t_L$ )      | 60 – 150 seconds   |
| Peak Temperature ( $T_p$ )                             |                                  | 260°C              |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                  | 20 – 40 seconds    |
| Ramp-down Rate                                         |                                  | 6°C/second max     |
| Time 25°C to peak Temperature ( $T_p$ )                |                                  | 8 minutes max.     |
| Do not exceed                                          |                                  | 260°C              |

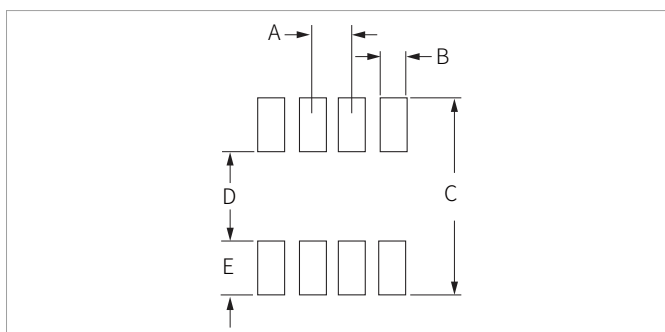


## SOP-8 PACKAGE INFORMATION



| Ref. | Millimeters |      | Inches   |       |
|------|-------------|------|----------|-------|
|      | Min.        | Max. | Min.     | Max.  |
| A    | 4.70        | 5.30 | 0.185    | 0.209 |
| B    | 3.80        | 4.20 | 0.150    | 0.165 |
| C    | 1.35        | 1.75 | 0.054    | 0.068 |
| D    | 0.35        | 0.49 | 0.014    | 0.019 |
| F    | 0.40        | 1.25 | 0.016    | 0.049 |
| G    | 1.27BSC     |      | 0.050BSC |       |
| J    | 0.18        | 0.25 | 0.007    | 0.009 |
| K    | 0.10        | 0.25 | 0.004    | 0.008 |
| P    | 5.80        | 6.20 | 0.229    | 0.244 |
| R    | 0.25        | 0.50 | 0.010    | 0.019 |

## RECOMMENDED PAD LAYOUT DIMENSIONS



| Ref. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min         | Max  | Min    | Max   |
| A    | 1.14        | 1.40 | 0.045  | 0.055 |
| B    | 0.64        | 0.89 | 0.025  | 0.035 |
| C    | 6.22        | -    | 0.245  | -     |
| D    | 3.94        | 4.17 | 0.155  | 0.165 |
| E    | 1.02        | 1.27 | 0.040  | 0.050 |

## ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SPM4407     | SOP-8             | 3000PCS  | 13"       |

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