# CPH5871

# Power MOSFET
## 30V, 52mΩ, 3.5A, Single N-Channel with Schottky Diode

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### Features

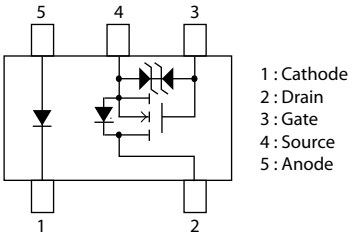
- Composite Type with a N-channel Sillicon MOSFET and a Schottky Barrier Diode Contained in One Package Facilitating High-density Mounting
- ESD Diode-Protected Gate
- Pb-Free, Halogen Free and RoHS Compliance

[MOSFET]
- High Speed Switching
- 1.8V Drive

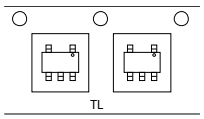
[SBD]
- Short Reverse Recovery Time
- Low Forward Voltage

| $V_{DSS}$ | $R_{DS}$(on) Max | $I_D$ Max |
|---|---|---|
| [MOSFET] 30V | 52mΩ@ 4.5V | 3.5A |
| | 74mΩ@ 2.5V | |
| | 132mΩ@ 1.8V | |

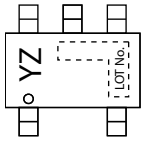
### Electrical Connection
**N-Channel**




### Packing Type : TL




### Marking




## Specifications

### Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| [MOSFET] | | | |
| Drain to Source Voltage | $V_{DSS}$ | 30 | V |
| Gate to Source Voltage | $V_{GSS}$ | ±12 | V |
| Drain Current (DC) | $I_D$ | 3.5 | A |
| Drain Current (Pulse) PW≤10μs, duty cycle≤1% | $I_{DP}$ | 14 | A |
| Power Dissipation When mounted on ceramic substrate (600mm$^2$ × 0.8mm) 1unit | $P_D$ | 0.9 | W |
| Junction Temperature | Tj | 150 | °C |
| Storage Temperature | Tstg | −55 to +125 | °C |
| [SBD] | | | |
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | 30 | V |
| Nonrepetitive Peak Reverse Surge Voltage | $V_{RSM}$ | 35 | V |
| Average Output Current | $I_O$ | 1 | A |
| Surge Forward Current 50Hz sine wave, 1cycle | $I_{FSM}$ | 10 | A |
| Junction Temperature | Tj | −55 to +125 | °C |
| Storage Temperature | Tstg | −55 to +125 | °C |

### Thermal Resistance Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Junction to Ambient When mounted on ceramic substrate (600mm$^2$ × 0.8mm) 1unit | $R_{\theta JA}$ | 138.8 | °C/W |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### ORDERING INFORMATION
See detailed ordering and shipping information on page 6 of this data sheet.

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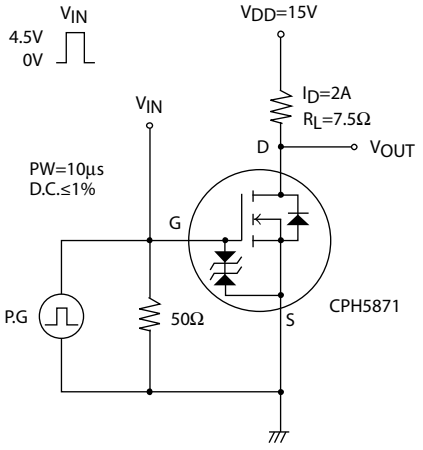
**Electrical Characteristics** at Ta = 25°C

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| [MOSFET] | | | | | | |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=1mA, $V_{GS}$=0V | 30 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V, $V_{GS}$=0V | | | 1 | μA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±8V, $V_{DS}$=0V | | | ±10 | μA |
| Gate Threshold Voltage | $V_{GS}(th)$ | $V_{DS}$=10V, $I_D$=1mA | 0.4 | | 1.3 | V |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=10V, $I_D$=2A | 2.0 | 3.4 | | S |
| Static Drain to Source On-State Resistance | $R_{DS}(on)1$ | $I_D$=2A, $V_{GS}$=4.5V | | 40 | 52 | mΩ |
| | $R_{DS}(on)2$ | $I_D$=1A, $V_{GS}$=2.5V | | 53 | 74 | mΩ |
| | $R_{DS}(on)3$ | $I_D$=0.5A, $V_{GS}$=1.8V | | 82 | 132 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=10V, f=1MHz | | 430 | | pF |
| Output Capacitance | Coss | | | 59 | | pF |
| Reverse Transfer Capacitance | Crss | | | 38 | | pF |
| Turn-ON Delay Time | $t_d(on)$ | See specified Test Circuit | | 10 | | ns |
| Rise Time | $t_r$ | | | 41 | | ns |
| Turn-OFF Delay Time | $t_d(off)$ | | | 36 | | ns |
| Fall Time | $t_f$ | | | 37 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=15V, $V_{GS}$=4.5V, $I_D$=3.5A | | 4.7 | | nC |
| Gate to Source Charge | Qgs | | | 0.8 | | nC |
| Gate to Drain “Miller” Charge | Qgd | | | 1.1 | | nC |
| Forward Diode Voltage | $V_{SD}$ | $I_S$=3.5A, $V_{GS}$=0V | | 0.8 | 1.2 | V |
| [SBD] | | | | | | |
| Reverse Voltage | $V_R$ | $I_R$=0.5mA | 30 | | | V |
| Forward Voltage | $V_{F1}$ | $I_F$=0.7A | | 0.45 | 0.5 | V |
| | $V_{F2}$ | $I_F$=1A | | 0.48 | 0.53 | V |
| Reverse Current | $I_R$ | $V_R$=16V | | | 15 | μA |
| Interterminal Capacitance | C | $V_R$=10V, f=1MHz, 1cycle | | 27 | | pF |
| Reverse Recovery Time | $t_{rr}$ | $I_F$= $I_R$=100mA, See specified Test Circuit | | | 10 | ns |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

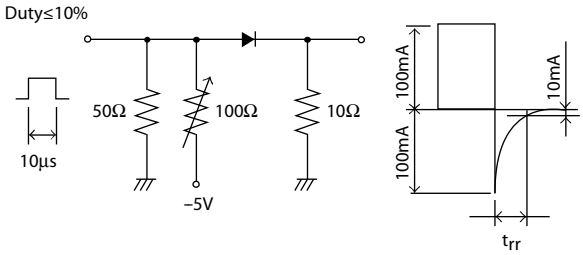
## Switching Time Test Circuit

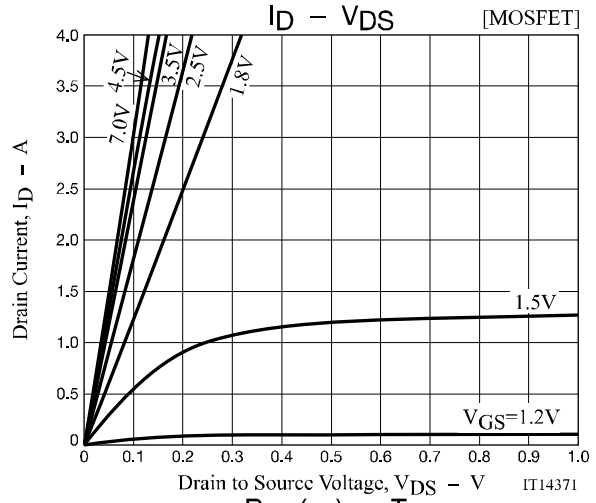
(MOSFET)

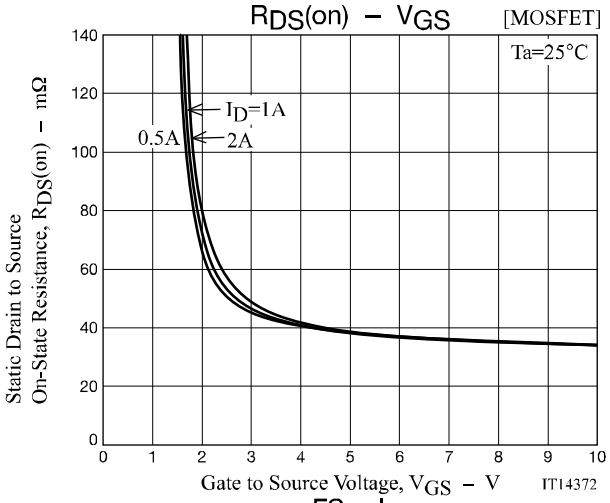


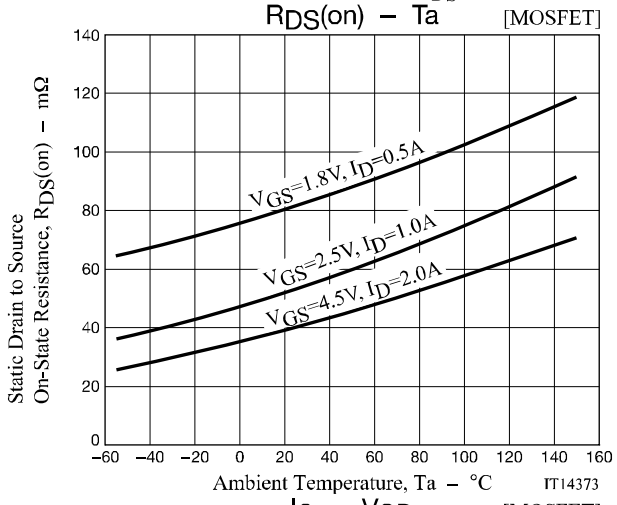

## trr Test Circuit

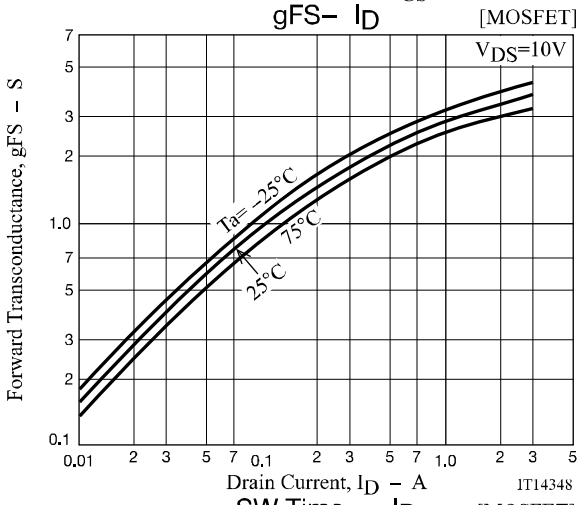
(SBD)

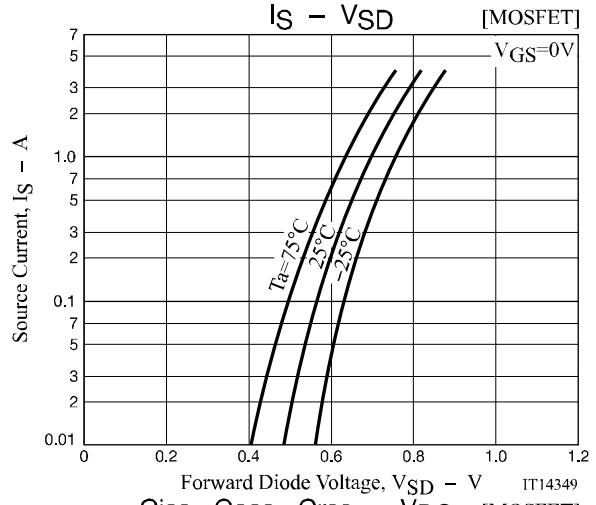


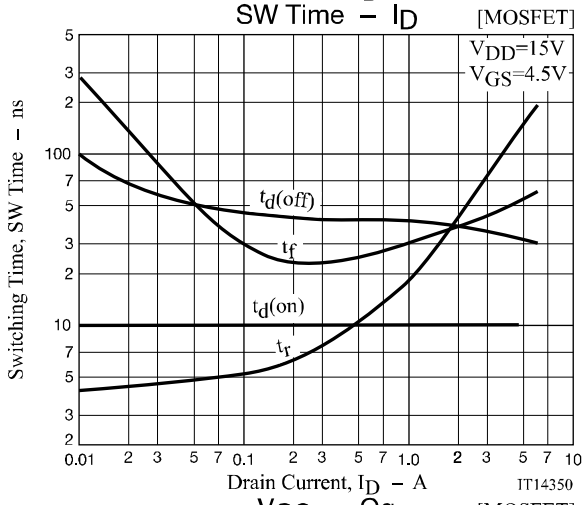

ID – VDS
[MOSFET]
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT14371
7.0V
4.5V
3.5V
2.5V
1.8V
1.5V
VGS=1.2V

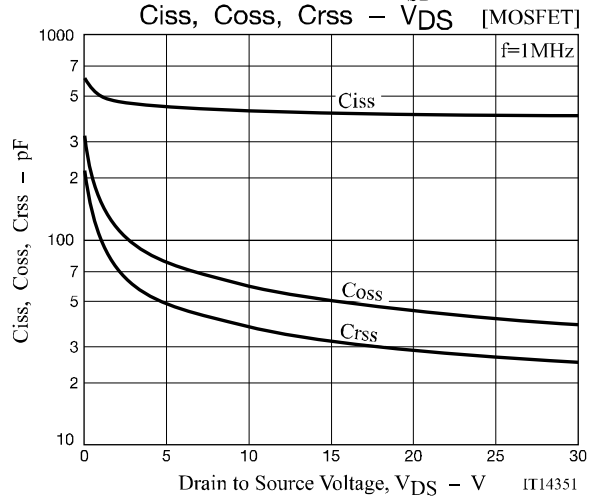

RDS(on) – VGS
[MOSFET]
Ta=25°C
Static Drain to Source
On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
IT14372
ID=1A
0.5A
2A

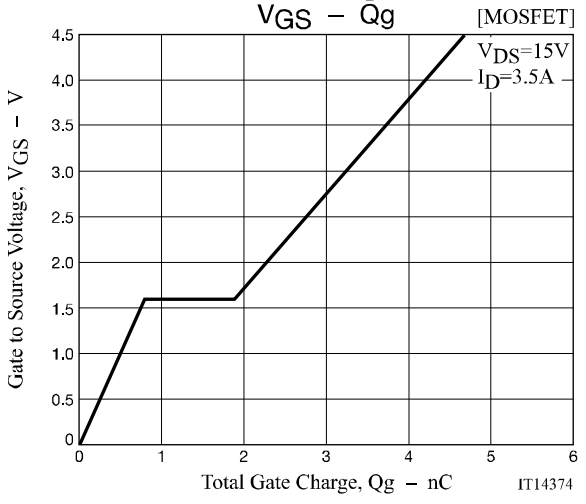

RDS(on) – Ta
[MOSFET]
Static Drain to Source
On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT14373
VGS=1.8V, ID=0.5A
VGS=2.5V, ID=1.0A
VGS=4.5V, ID=2.0A


gFS– ID
[MOSFET]
VDS=10V
Forward Transconductance, gFS – S
Drain Current, ID – A
IT14348
Ta= –25°C
75°C
25°C

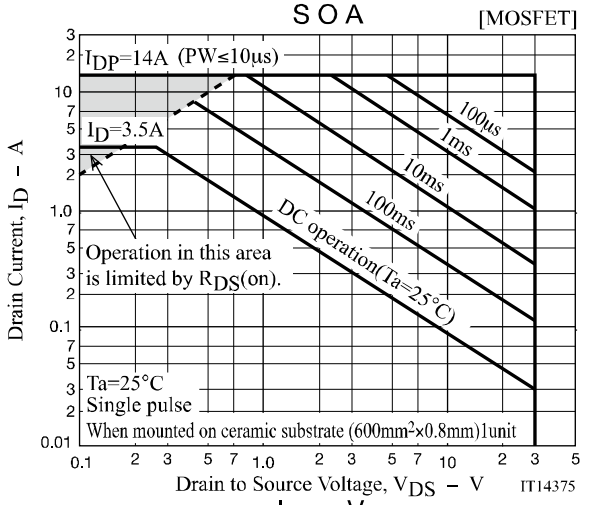

IS – VSD
[MOSFET]
VGS=0V
Source Current, IS – A
Forward Diode Voltage, VSD – V
IT14349
Ta=75°C
25°C
–25°C


SW Time – ID
[MOSFET]
VDD=15V
VGS=4.5V
Switching Time, SW Time – ns
Drain Current, ID – A
IT14350
td(off)
tf
td(on)
tr

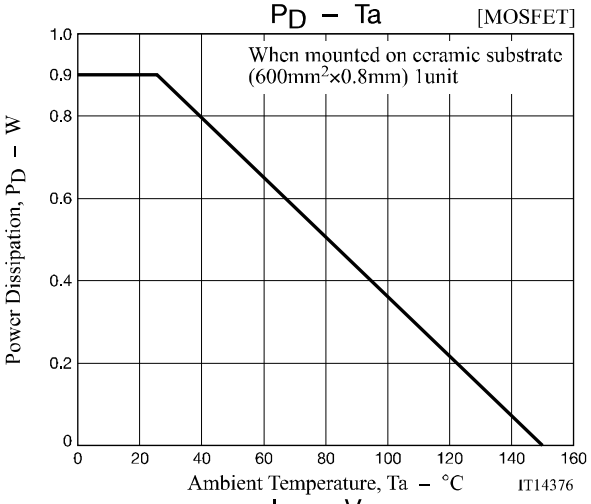

Ciss, Coss, Crss – VDS
[MOSFET]
f=1MHz
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT14351
Ciss
Coss
Crss


VGS – Qg
[MOSFET]
VDS=15V
ID=3.5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT14374

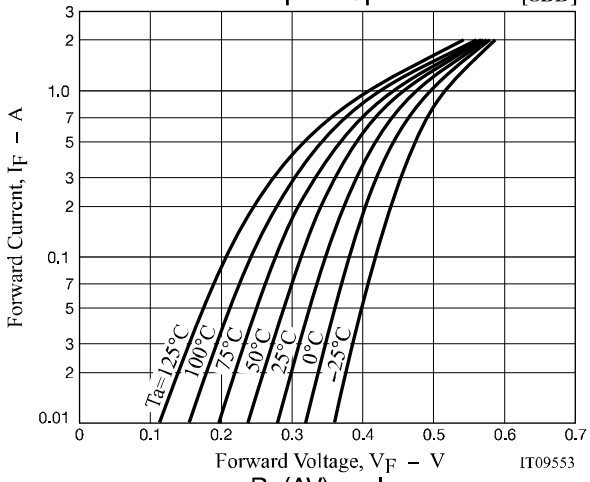
S O A [MOSFET]



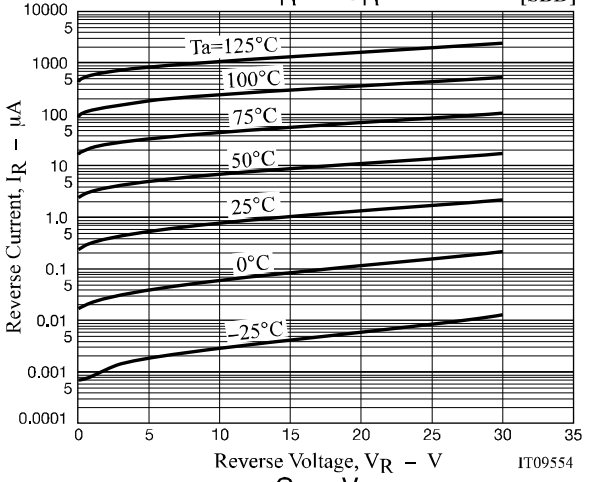

PD – Ta [MOSFET]



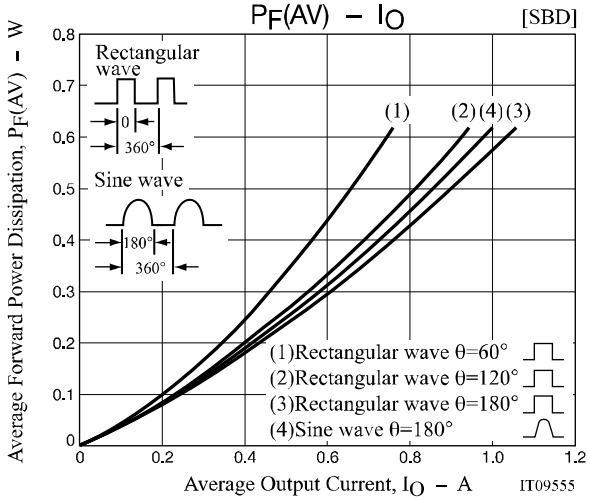

IF – VF [SBD]



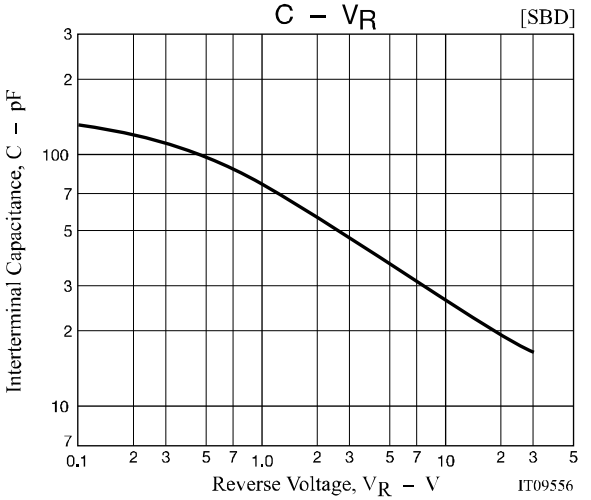

IR – VR [SBD]



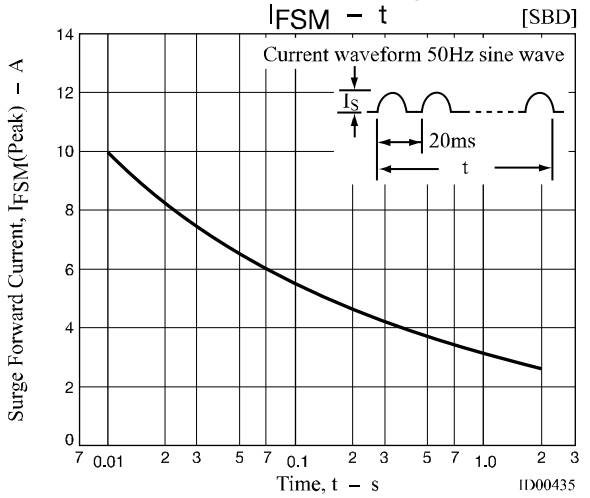

PF(AV) – IO [SBD]

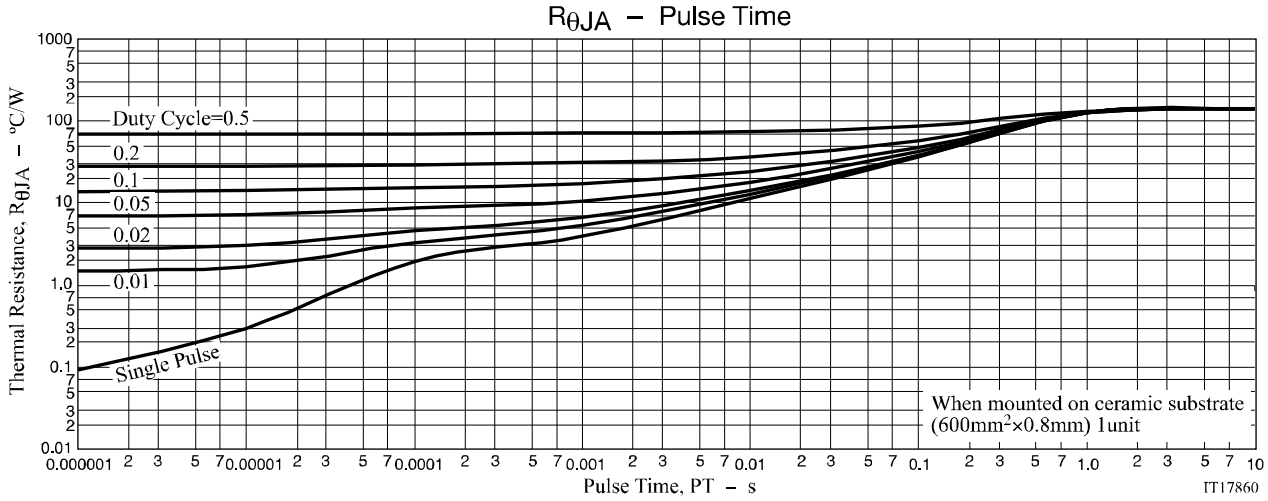



C – VR [SBD]




IFSM – t [SBD]




RθJA – Pulse Time
Thermal Resistance, RθJA – °C/W
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(600mm²×0.8mm) 1unit
Pulse Time, PT – s
IT17860

## Package Dimensions

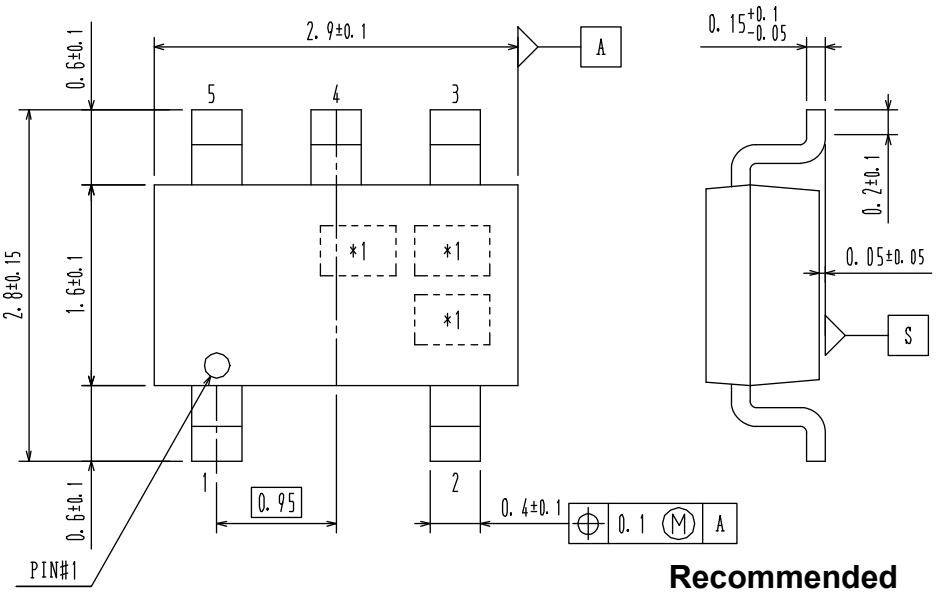
CPH5871-TL-H / CPH5871-TL-W

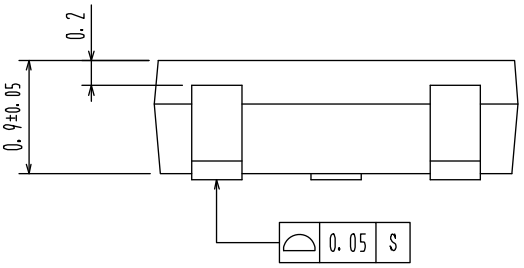
### CPH5

CASE 318BC
ISSUE O

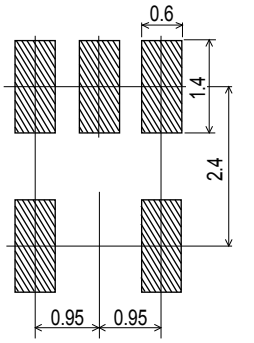
unit : mm

1 : Cathode
2 : Drain
3 : Gate
4 : Source
5 : Anode




**Recommended Soldering Footprint**




*1:Lot indication

## ORDERING INFORMATION

| Device | Package | Shipping | Note |
|---|---|---|---|
| CPH5871-TL-H | CPH5<br>SC-74A, SOT-25 | 3,000 pcs. / Tape & Reel | Pb-Free<br>and Halogen Free |
| CPH5871-TL-W | | | |

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D. http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF

Note on usage : Since the CPH5871 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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