

FMCRB25-120

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# FMCRB25-120

## 25.0A 1200V Sensitive Gate Silicon Controlled Rectifiers Blocking Voltage

### Features

- $V_D / V_R = 1200V$ ,  $I_{T(RMS)} = 25A$ ,  $I_{GT(Max)} = 50mA$ .
- High thermal cycling performance and high voltage capacity.
- Very high current surge capacity.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates halogen free parts, ex. FMCRP25-120-H.

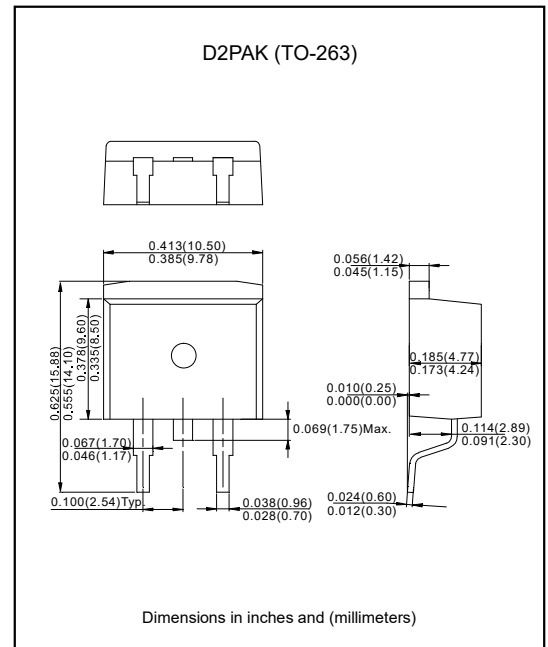
### Applications

- Line rectifying 50/60 Hz.
- Soft start AC motor control.
- DC motor control.
- Power converter.
- AC power control.
- Lighting and temperature control.

### Mechanical data

- Epoxy : UL94-V0 reted Flame retardent.
- Case : Molded plastic, D2PAK (TO-263).
- Terminals : Solder plated, solder able per MIL-STD-750, Method 2026.
- Mounting Position : Any.

### Package outline



### Maximum ratings ( $T_A = 25^\circ C$ , Unless otherwise noted)

| Parameter                                                                                                                  | Symbol          | Ratings         | Unit         |
|----------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|--------------|
| Repetitive peak off-state voltage <small>(<math>T = 25^\circ C</math>)</small>                                             | $V_{DRM}$       | 1200            | V            |
| Repetitive peak reverse voltage <small>(<math>T = 25^\circ C</math>)</small>                                               | $V_{RRM}$       | 1200            | V            |
| Non- repetitive surge peak off- state voltage                                                                              | $V_{DSM}$       | $V_{DRM} + 100$ | V            |
| Non- repetitive peak reverse voltage                                                                                       | $V_{RSM}$       | $V_{RRM} + 100$ | V            |
| RMS on-state current <small>(<math>T = 110^\circ C</math>)</small>                                                         | $I_{T(RMS)}$    | 25              | A            |
| Non-repetitive surge peak on-state current <small>(<math>180^\circ</math> conduction angle, <math>F = 50Hz</math>)</small> | $I_{TSM}$       | 300             | A            |
| Average on-state current <small>(<math>180^\circ</math> conduction angle)</small>                                          | $I_{T(AV)}$     | 16              | A            |
| Circuit fusing considerations <small><math>I^2t</math> value for fusing (<math>t_p = 10ms</math>)</small>                  | $I^2t$          | 450             | $A^2s$       |
| Peak gate current                                                                                                          | $I_{GM}$        | 4               | A            |
| Average gate power dissipation                                                                                             | $P_{G(AV)}$     | 1               | W            |
| Critical rate of rise of on-state current <small>(<math>I = 2 \times I_{GT}</math>, <math>t_r \leq 100ns</math>)</small>   | $di/dt$         | 50              | $A/\mu s$    |
| Thermal resistance, junction to case <small>(DC)</small>                                                                   | $R_{\theta JC}$ | 1               | $^\circ C/W$ |
| Operating Junction temperature                                                                                             | $T_J$           | +125            | $^\circ C$   |
| Storage temperature range                                                                                                  | $T_{STG}$       | -40 to +150     | $^\circ C$   |

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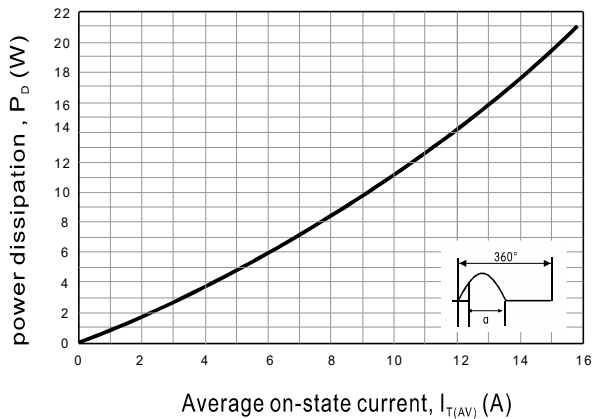
## Electrical characteristics (At T=25°C unless otherwise noted)

| Parameter                                  | Symbol    | Conditions                                           | Min. | Typ. | Max. | Unit       |
|--------------------------------------------|-----------|------------------------------------------------------|------|------|------|------------|
| <b>On characteristics</b>                  |           |                                                      |      |      |      |            |
| Gate Trigger Current                       | $I_{GT}$  | $V=12V, R=140\Omega$                                 |      |      | 50   | mA         |
| Holding Current                            | $I_H$     | $I_T=50mA$                                           |      |      | 80   | mA         |
| Latch Current                              | $I_L$     | $I_G=1.2 I_{GT}$                                     |      |      | 180  | mA         |
| Gate trigger voltage                       | $V_{GT}$  | $V=12V, R=140\Omega$                                 |      |      | 1.3  | V          |
| Non-triggering gate voltage                | $V_{GD}$  | $V_D=V_{DRM}, T_J=125^\circ C$                       | 0.2  |      |      | V          |
| <b>Static characteristics</b>              |           |                                                      |      |      |      |            |
| Peak forward on-state voltage              | $V_{TM}$  | $I_{TM}=50A, t_p=380\mu s, T_J=25^\circ C$           |      |      | 1.7  | V          |
| Forward and reverse leakage current        | $I_{DRM}$ | $V_D=V_{DRM}, V_R=V_{RRM}, T_J=25^\circ C$           |      |      | 5    | $\mu A$    |
| Leakage current for diodes                 | $I_{RRM}$ | $V_D=V_{DRM}, V_R=V_{RRM}, T_J=125^\circ C$          |      |      | 4    | mA         |
| <b>Dynamic parameters</b>                  |           |                                                      |      |      |      |            |
| Critical rate of rise of off-state voltage | $dV/dt$   | $V_D=2/3 V_{DRM}, \text{gate open } T_J=125^\circ C$ | 500  |      |      | V/ $\mu s$ |

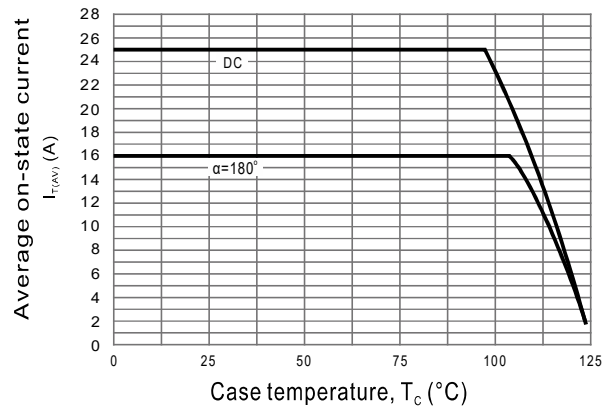
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## Rating and characteristic curves

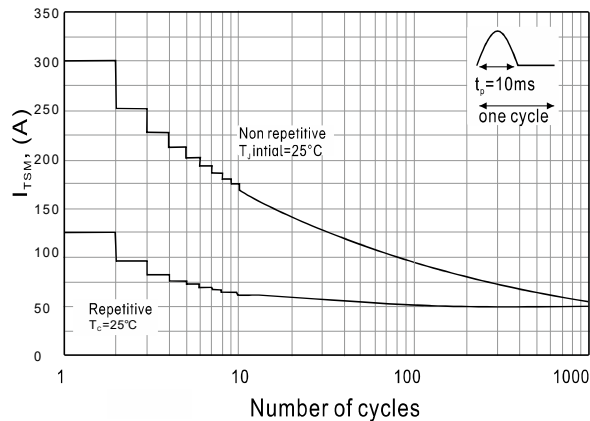
Maximum power dissipation vs. average on-state current



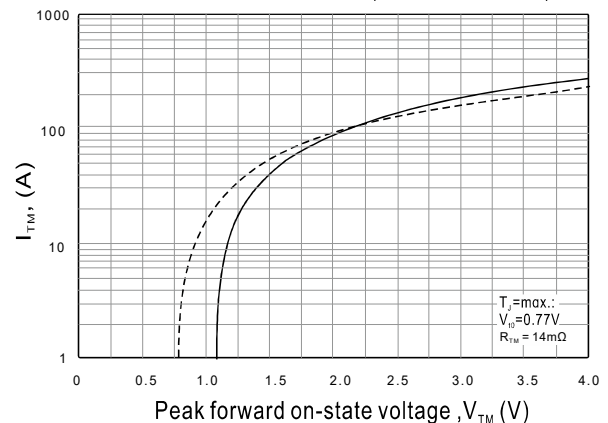
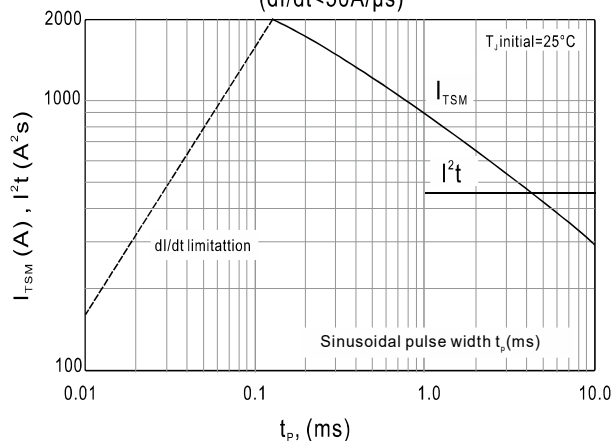
On-state current vs. Case temperature



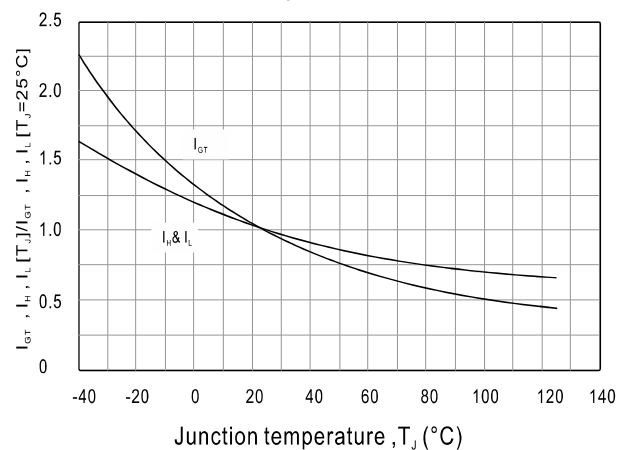
Surge peak on-state current vs. Number of cycles



On-state characteristics (maximum values)

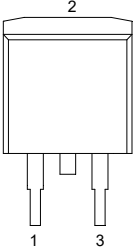
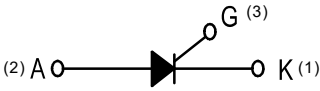
Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 10\text{ms}$ , and corresponding value of  $12t$  ( $di/dt < 50\text{A}/\mu\text{s}$ )

Relative variations of gate trigger current holding current and latching current vs. Junction temperature



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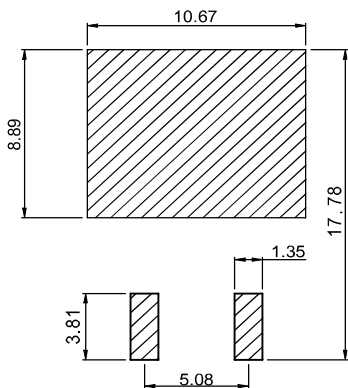
Pinning information

| Pin                                                          | Simplified outline                                                                | Symbol                                                                              |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin 1    K: Cathode<br>Pin 2    A: Anode<br>Pin 3    G: Gate |  |  |

Marking

| Type number | Marking code |
|-------------|--------------|
| FMCRB25-120 | S2550-12Z    |

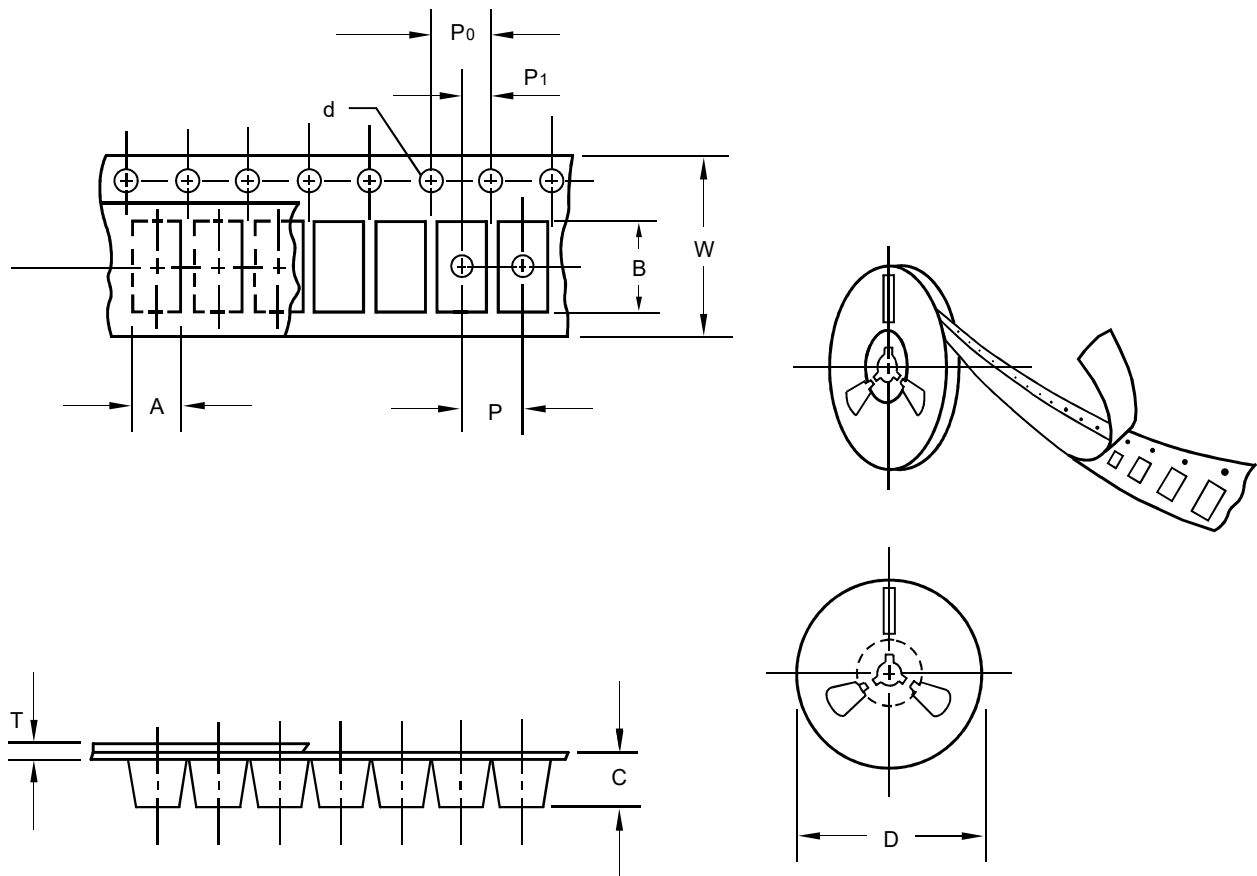
Suggested solder pad layout



Note:  
1.Controlling dimension:in millimeters.  
2.General tolerance:± 0.1 mm.  
3.The pad layout is for reference purposes only.

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## Packing information



unit:mm

| Item                      | Symbol         | Tolerance | D2PAK<br>(TO-263) |
|---------------------------|----------------|-----------|-------------------|
| Carrier width             | A              | 0.2       | 10.70             |
| Carrier length            | B              | 0.35      | 16.25             |
| Carrier depth             | C              | 0.3       | 5.30              |
| Sprocket hole             | d              | 0.1       | 1.50              |
| 13" Reel outside diameter | D              | 2.0       | 332               |
| 7" Reel outside diameter  | D              | 2.0       | -                 |
| 7" Reel inner diameter    | D <sub>1</sub> | min       | -                 |
| Punch hole pitch          | P              | 0.2       | 16.1              |
| Sprocket hole pitch       | P <sub>0</sub> | 0.2       | 4.1               |
| Embossment center         | P <sub>1</sub> | 0.2       | 2.1               |
| Overall tape thickness    | T              | 0.2       | 0.45              |
| Tape width                | W              | 0.3       | 24.3              |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.  
(For reference only.)

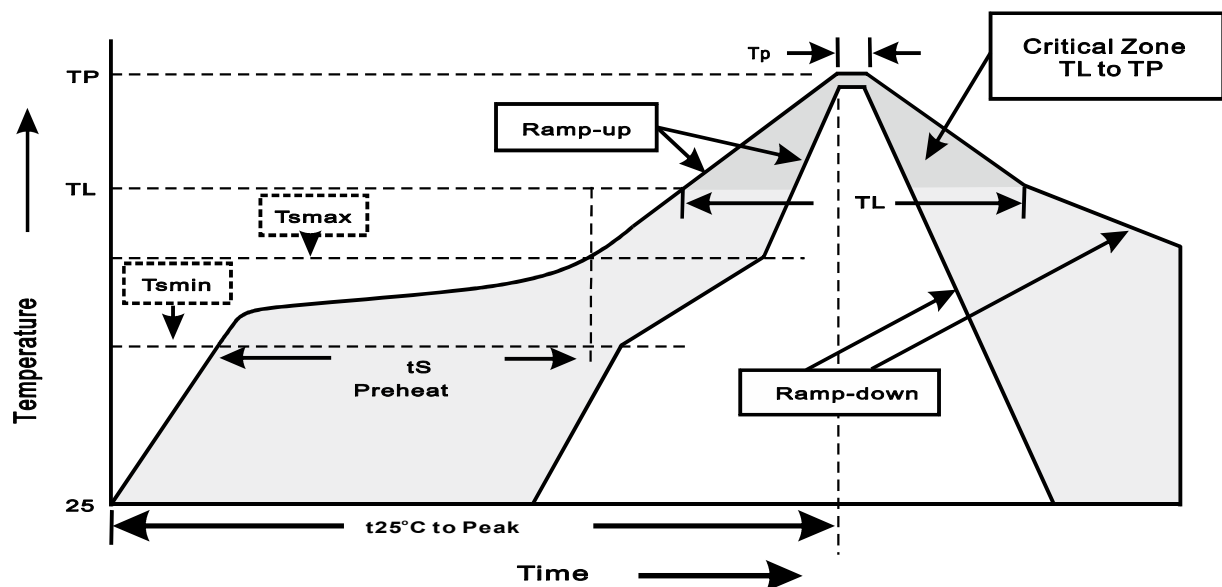
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## Reel Packing

| PACKAGE      | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) |
|--------------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|
| D2PAK/TO-263 | 13"       | 800        | 16.0                    | 800       | 335*335*38      | 330             | 350*330*360       | 6,400        |

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



### 3.Reflow soldering

| Profile Feature                                                                                                               | Soldering Condition         |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate(T <sub>L</sub> to T <sub>P</sub> )                                                                       | <3°C/sec                    |
| Preheat<br>-Temperature Min(T <sub>smín</sub> )<br>-Temperature Max(T <sub>smáx</sub> )<br>-Time(min to max)(t <sub>s</sub> ) | 150°C<br>200°C<br>60~120sec |
| T <sub>smáx</sub> to T <sub>L</sub><br>-Ramp-upRate                                                                           | <3°C/sec                    |
| Time maintained above:<br>-Temperature(T <sub>L</sub> )<br>-Time(t <sub>L</sub> )                                             | 217°C<br>60~260sec          |
| Peak Temperature(T <sub>P</sub> )                                                                                             | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature(t <sub>P</sub> )                                                                   | 10~30sec                    |
| Ramp-down Rate                                                                                                                | <3°C/sec                    |
| Time 25°C to Peak Temperature                                                                                                 | <6minutes                   |