



## JMH65R190PCFD

### Features

- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $\Delta V_{DS}$  Tested
- Halogen-free; RoHS-compliant

### Applications

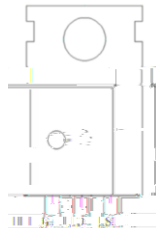
- SMPS with PFC
- Flyback
- Silver ATX, adapter, TV, lighting, Telecom

### Product Summary

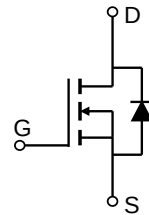
| Parameters                      | Value | Unit       |
|---------------------------------|-------|------------|
| $V_{DSS}$                       | 650   | V          |
| $V_{GS(th)}_{Typ}$              | 3.4   | V          |
| $I_D(@V_{GS}=10V)$              | 15    | A          |
| $R_{DS(ON)}_{Typ}(@V_{GS}=10V)$ | 156   | m $\Omega$ |



TO-220-3L Top View



Pin Assignment



Schematic Diagram

### Ordering Information

| Device          | Marking   | MSL | Form | Package   | Tube(pcs) | Per Carton (pcs) |
|-----------------|-----------|-----|------|-----------|-----------|------------------|
| JMH65R190PCFD-U | H65R190PF | N/A | Tube | TO-220-3L | 50        | 5000             |

### Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

| Symbol         | Parameter                                     | Value                                                 | Unit             |
|----------------|-----------------------------------------------|-------------------------------------------------------|------------------|
| $V_{DS}$       | Drain-to-Source Voltage                       | 650                                                   | V                |
| $V_{GS}$       | Gate-to-Source Voltage                        | $\pm 30$                                              | V                |
| $I_D$          | Continuous Drain Current                      | $T_C = 25^\circ\text{C}$<br>$T_C = 100^\circ\text{C}$ | A                |
| $I_{DM}$       | Pulsed Drain Current <sup>(1)</sup>           | Refer to Fig.4                                        | A                |
| $E_{AS}$       | Single Pulsed Avalanche Energy <sup>(2)</sup> | 65                                                    | mJ               |
| $P_D$          | Power Dissipation                             | $T_C = 25^\circ\text{C}$<br>$T_C = 100^\circ\text{C}$ | W                |
| $T_J, T_{STG}$ | Junction & Storage Temperature Range          | -55 to 150                                            | $^\circ\text{C}$ |

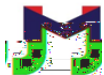
### Thermal Characteristics

| Symbol          | Parameter                                              | Max | Unit               |
|-----------------|--------------------------------------------------------|-----|--------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient <sup>(3)</sup> | 68  | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                   | 1.1 |                    |

Electrical Characteristics (T<sub>J</sub> = 25°C unless otherwise specified)

| Symbol                                             | Conditions                                    | Min. | Typ. | Max. | Unit |
|----------------------------------------------------|-----------------------------------------------|------|------|------|------|
| Off Characteristics                                |                                               |      |      |      |      |
| V <sub>(BR)DSS</sub>                               |                                               | 650  | -    | -    | V    |
| I <sub>DSS</sub>                                   |                                               | -    | -    | 10.0 | μA   |
| I <sub>GSS</sub>                                   |                                               | -    | -    | ±100 | nA   |
| V <sub>GS(th)</sub>                                |                                               | 2.4  | 3.4  | 4.5  | V    |
| R <sub>DS(ON)</sub>                                |                                               | -    | 156  | 190  | mΩ   |
| R <sub>g</sub>                                     |                                               | -    | 4.9  | -    | Ω    |
| C <sub>iss</sub>                                   |                                               | 1084 | 1517 | 2049 | pF   |
| C <sub>oss</sub>                                   |                                               | 28   | 39   | 52   | pF   |
| C <sub>rss</sub>                                   |                                               | -    | 5.9  | -    | pF   |
| Q <sub>g</sub>                                     |                                               | 23   | 32   | 43   | nC   |
| Q <sub>gs</sub>                                    |                                               | -    | 10   | -    | nC   |
| Q <sub>gd</sub>                                    |                                               | -    | 11   | -    | nC   |
| t <sub>d(on)</sub>                                 |                                               | -    | 36   | -    | ns   |
| t <sub>r</sub>                                     | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 310V | -    | 38   | -    | ns   |
| t <sub>d(off)</sub>                                | I <sub>D</sub> = 10A, R <sub>GEN</sub> = 24Ω  | -    | 100  | -    | ns   |
| t <sub>f</sub> Turn-Off Fall Time                  |                                               | -    | 30   | -    | ns   |
| Body Diode Characteristics                         |                                               |      |      |      |      |
| I <sub>S</sub>                                     |                                               | -    | -    | 15   | A    |
| I <sub>SM</sub>                                    |                                               | -    | -    | 61   | A    |
| V <sub>SD</sub> Body Diode Forward Voltage         | V <sub>GS</sub> = 0V, I <sub>S</sub> = 10A    | -    |      | 1.2  | V    |
| t <sub>rr</sub> Body Diode Reverse Recovery Time   | I <sub>F</sub> = 10A, di/dt = 100A/us         | 94   | 131  | 177  | ns   |
| Q <sub>rr</sub> Body Diode Reverse Recovery Charge |                                               | -    | 851  | -    | nC   |

- Notes:
- 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  - 2. E<sub>AS</sub> condition: Starting T<sub>J</sub>=25C, V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, R<sub>G</sub>=25ohm, L=10mH, I<sub>AS</sub>=3.6A, V<sub>DD</sub>=0V during time in avalanche.
  - 3. R<sub>DS(on)</sub> is measured with the device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - 4. Pulse Test: Pulse Width      V    X W \   & 0.5% .H



## Typical Performance Characteristics

Figure 1: Power De-rating

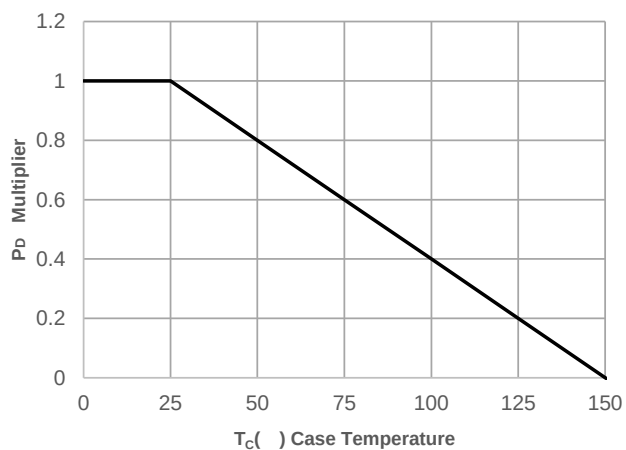
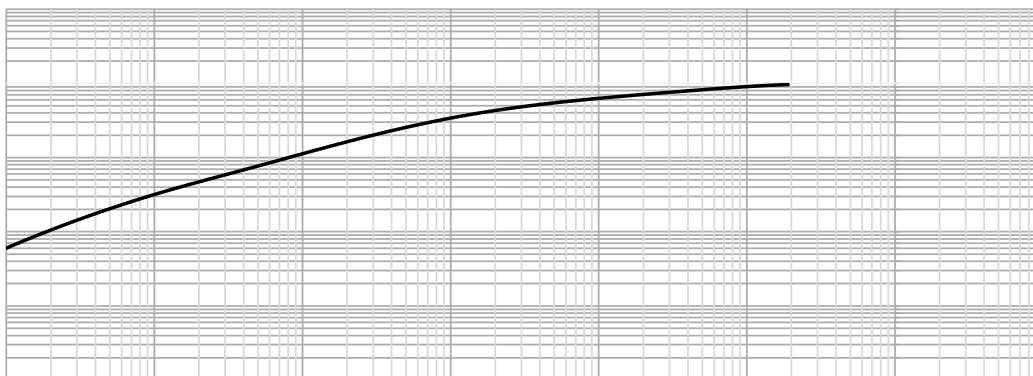
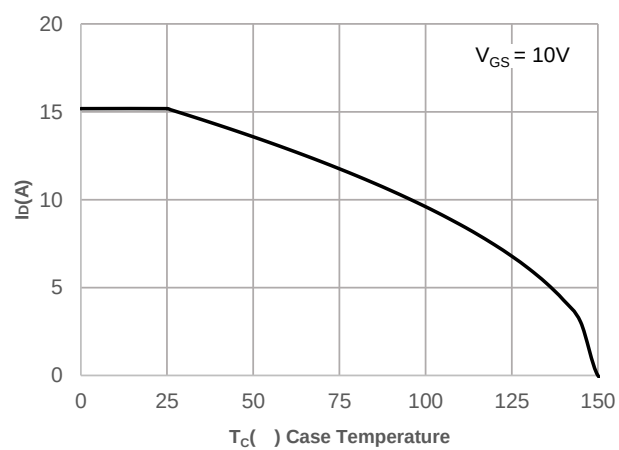
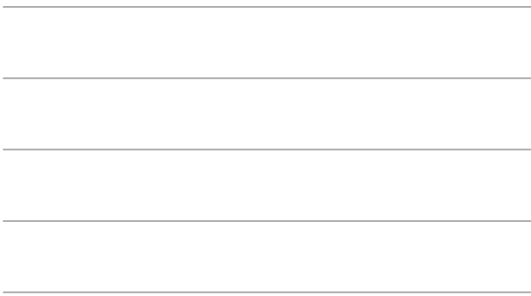
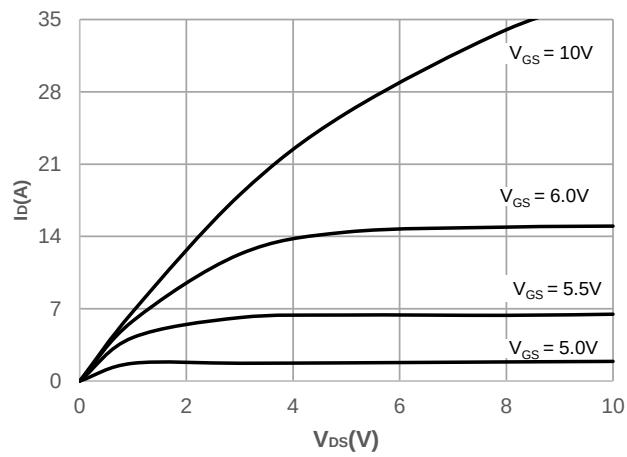


Figure 2: Current De-rating



Typical Performance Characteristics

Figure 5: Output Characteristics





## Test Circuit



Figure 1: Gate Charge Test Circuit & Waveform

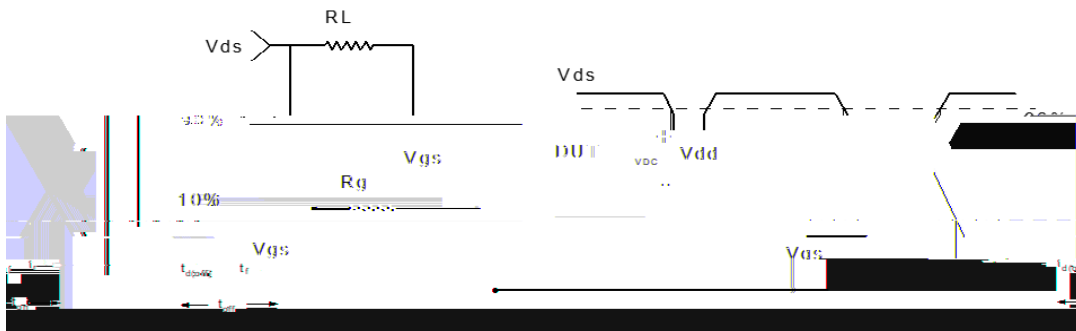


Figure 2: Resistive Switching Test Circuit & Waveform

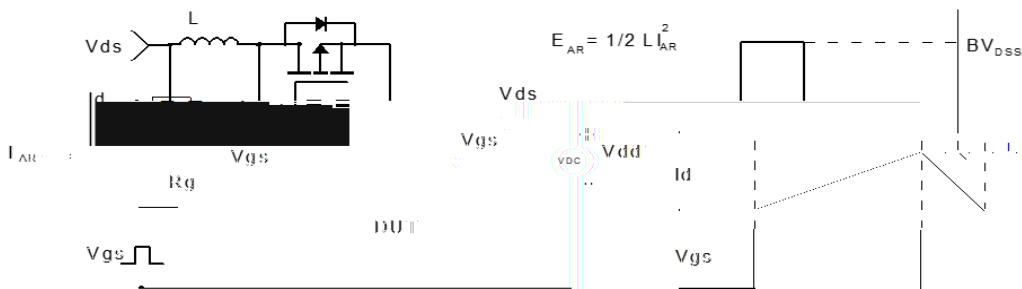


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

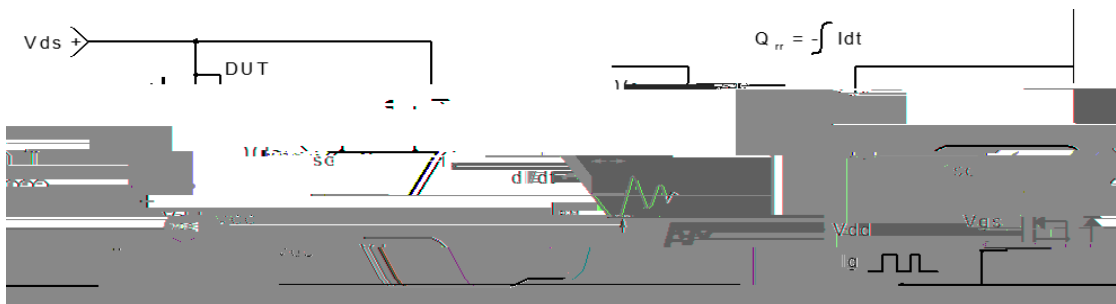


Figure 4: Diode Recovery Test Circuit & Waveform

**Package Mechanical Data(TO-220-3L)**

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