

## N-Channel Enhancement Mode Power MOSFET

### Description

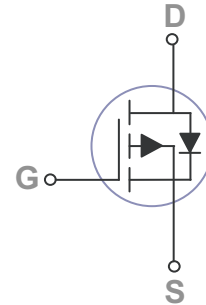
The RM6A5N30S6 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

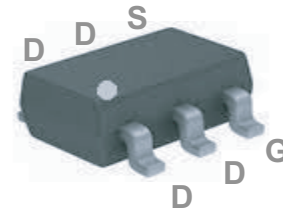
- $V_{DS} = 32V, I_D = 6.5A$   
 $R_{DS(ON)} < 35 m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 55 m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low  $R_{DS(on)}$
- Fully characterized Avalanche voltage and current

### Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply
- Halogen-free
- P/N suffix V means AEC-Q101 qualified, e.g:RM6A5N30S6V



Schematic diagram



SOT-23-6 top view

### Package Marking and Ordering Information

| Device Marking | Device     | Device Package | Reel Size | Tape width | Quantity   |
|----------------|------------|----------------|-----------|------------|------------|
| 6A5N30         | RM6A5N30S6 | SOT-23-6       | Ø180mm    | 8 mm       | 3000 units |

### Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

| Parameter                                        | Symbol             | Limit      | Unit       |
|--------------------------------------------------|--------------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$           | 32         | V          |
| Gate-Source Voltage                              | $V_{GS}$           | $\pm 20$   | V          |
| Drain Current-Continuous                         | $I_D$              | 6.5        | A          |
| Drain Current-Continuous ( $T_C = 70^\circ C$ )  | $I_D (70^\circ C)$ | 5.1        | A          |
| Pulsed Drain Current                             | $I_{DM}$           | 20         | A          |
| Maximum Power Dissipation                        | $P_D$              | 2.7        | W          |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$     | -55 To 150 | $^\circ C$ |

### Thermal Characteristic

|                                                             |                 |    |              |
|-------------------------------------------------------------|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | $R_{\theta JA}$ | 74 | $^\circ C/W$ |
|-------------------------------------------------------------|-----------------|----|--------------|

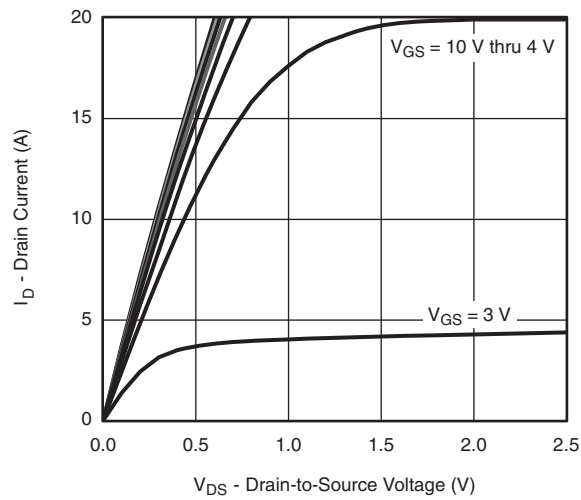
## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                          | Symbol              | Condition                                                                               | Min | Typ | Max  | Unit |
|------------------------------------|---------------------|-----------------------------------------------------------------------------------------|-----|-----|------|------|
| Off Characteristics                |                     |                                                                                         |     |     |      |      |
| Drain-Source Breakdown Voltage     | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                               | 32  | -   | -    | V    |
| Zero Gate Voltage Drain Current    | I <sub>DSS</sub>    | V <sub>DS</sub> =30V,V <sub>GS</sub> =0V                                                | -   | -   | 1    | μA   |
| Gate-Body Leakage Current          | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V                                               | -   | -   | ±100 | nA   |
| On Characteristics (Note 3)        |                     |                                                                                         |     |     |      |      |
| Gate Threshold Voltage             | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA                                 | 1.3 | 1.8 | 2.5  | V    |
| Drain-Source On-State Resistance   | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A                                              | -   | 27  | 35   | mΩ   |
|                                    |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.5A                                             | -   | 40  | 55   |      |
| Forward Transconductance           | g <sub>FS</sub>     | V <sub>DS</sub> =5V,I <sub>D</sub> =10A                                                 | -   | 15  | -    | S    |
| Dynamic Characteristics (Note4)    |                     |                                                                                         |     |     |      |      |
| Input Capacitance                  | C <sub>ISS</sub>    | V <sub>DS</sub> =15V,V <sub>GS</sub> =0V,<br>F=1.0MHz                                   | -   | 325 | -    | PF   |
| Output Capacitance                 | C <sub>OSS</sub>    |                                                                                         | -   | 60  | -    | PF   |
| Reverse Transfer Capacitance       | C <sub>rSS</sub>    |                                                                                         | -   | 30  | -    | PF   |
| Switching Characteristics (Note 4) |                     |                                                                                         |     |     |      |      |
| Turn-on Delay Time                 | t <sub>d(on)</sub>  | V <sub>DD</sub> =15V,I <sub>D</sub> =4A<br>V <sub>GEN</sub> =4.5V,R <sub>L</sub> =3.8 Ω | -   | 12  | 18   | nS   |
| Turn-on Rise Time                  | t <sub>r</sub>      |                                                                                         | -   | 13  | 20   | nS   |
| Turn-Off Delay Time                | t <sub>d(off)</sub> |                                                                                         | -   | 16  | 25   | nS   |
| Turn-Off Fall Time                 | t <sub>f</sub>      |                                                                                         | -   | 11  | 17   | nS   |
| Total Gate Charge                  | Q <sub>g</sub>      | V <sub>DS</sub> =15V,I <sub>D</sub> =5A,<br>V <sub>GS</sub> =4.5V                       | -   | 2.8 | 4.2  | nC   |
| Gate-Source Charge                 | Q <sub>gs</sub>     |                                                                                         | -   | 1.1 | -    | nC   |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |                                                                                         | -   | 0.8 | -    | nC   |
| Drain-Source Diode Characteristics |                     |                                                                                         |     |     |      |      |
| Diode Forward Voltage (Note 3)     | V <sub>SD</sub>     | V <sub>GS</sub> =0V,I <sub>S</sub> =0.5A                                                | -   | 0.7 | 1.3  | V    |
| Diode Forward Current (Note 2)     | I <sub>S</sub>      |                                                                                         | -   | -   | 1.3  | A    |

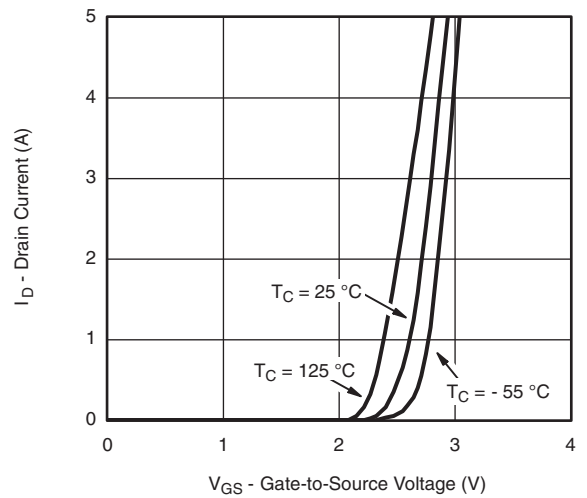
### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

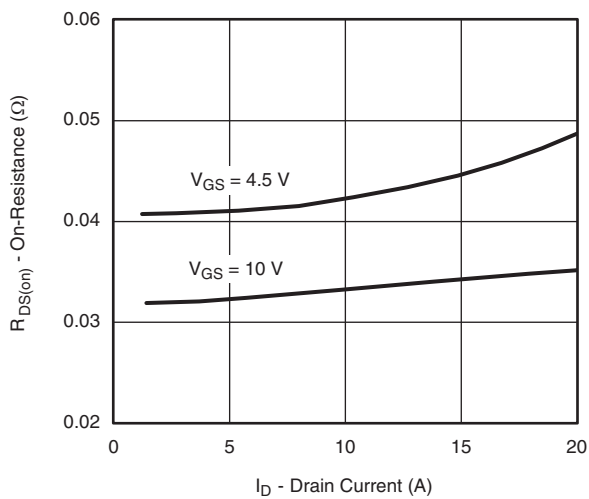
## RATING AND CHARACTERISTICS CURVES (RM6A5N30S6)



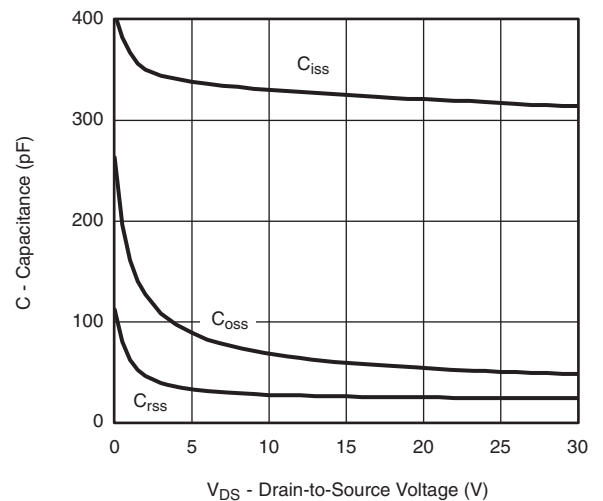
**Output Characteristics**



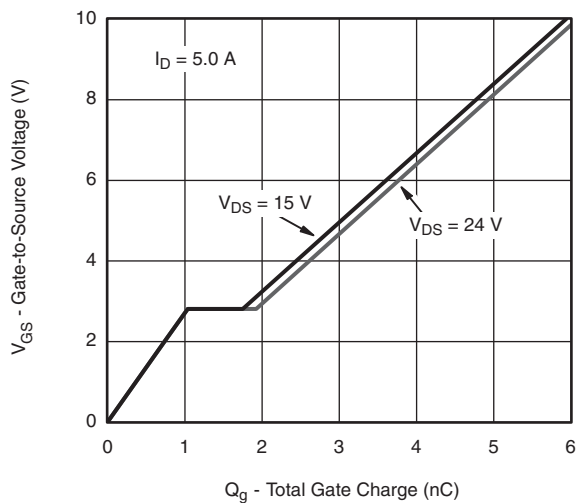
**Transfer Characteristics**



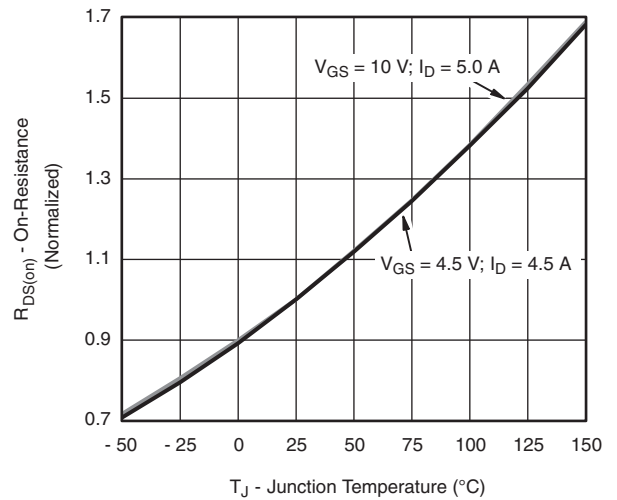
**On-Resistance vs. Drain Current**



**Capacitance**

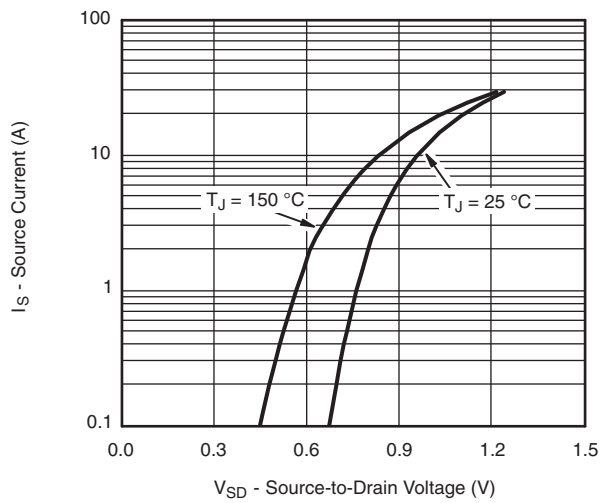


**Gate Charge**

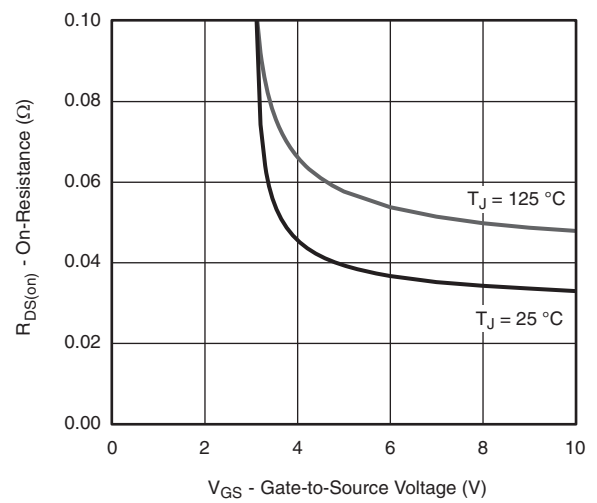


**On-Resistance vs. Junction Temperature**

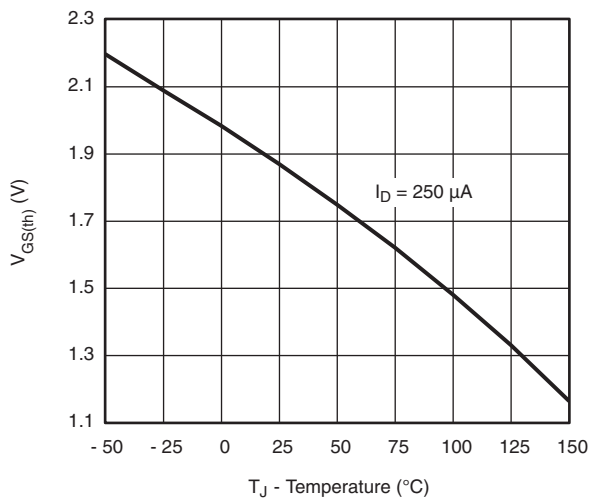
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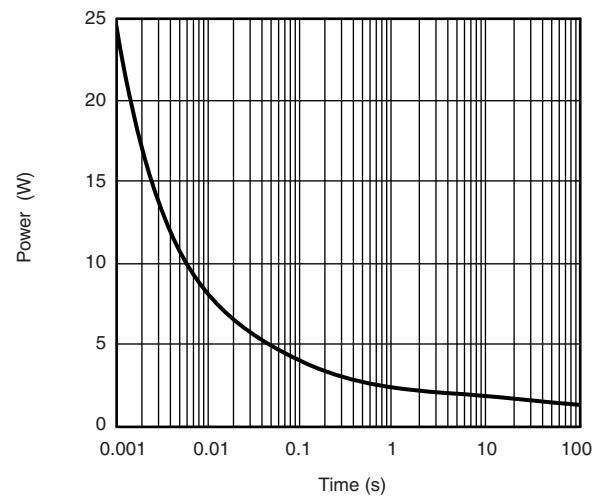
Source-Drain Diode Forward Voltage



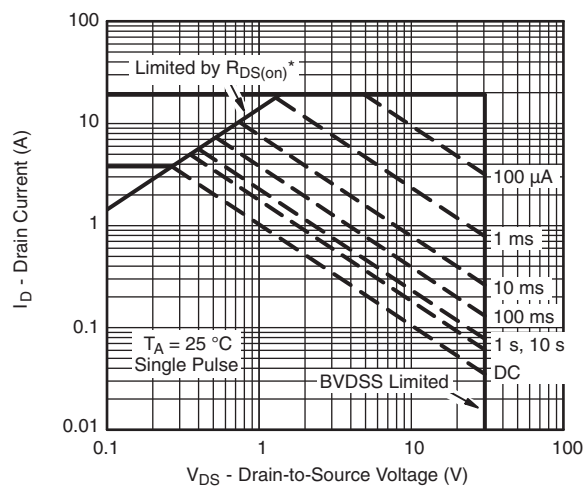
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



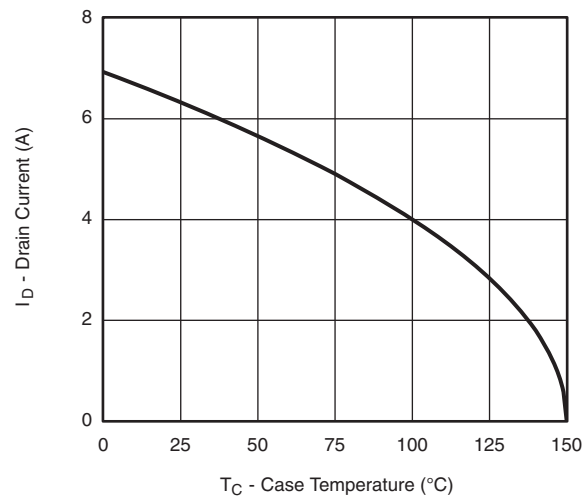
Single Pulse Power



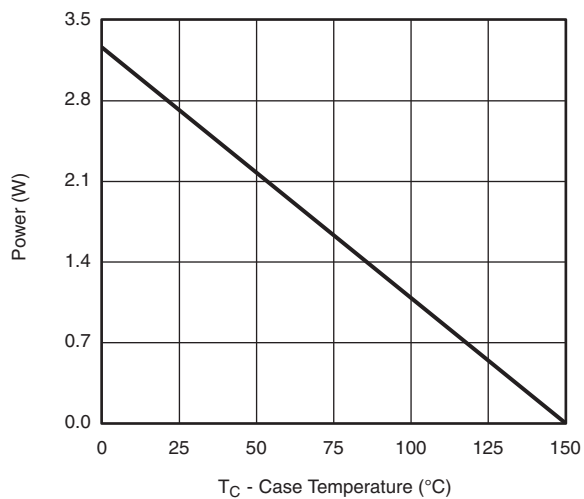
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area, Junction-to-Ambient

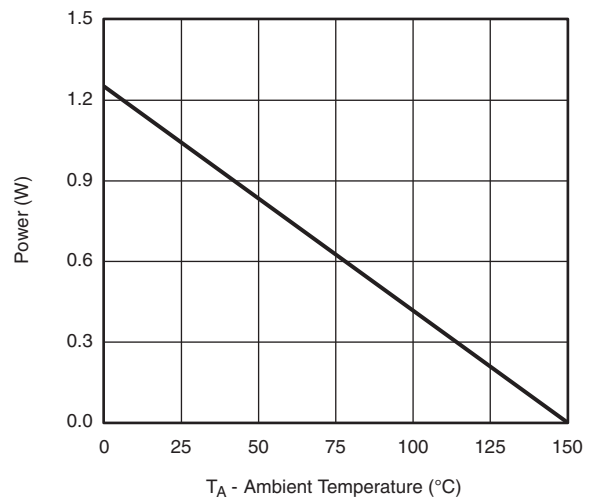
## RATING AND CHARACTERISTICS CURVES (RM6A5N30S6)



**Current Derating\***



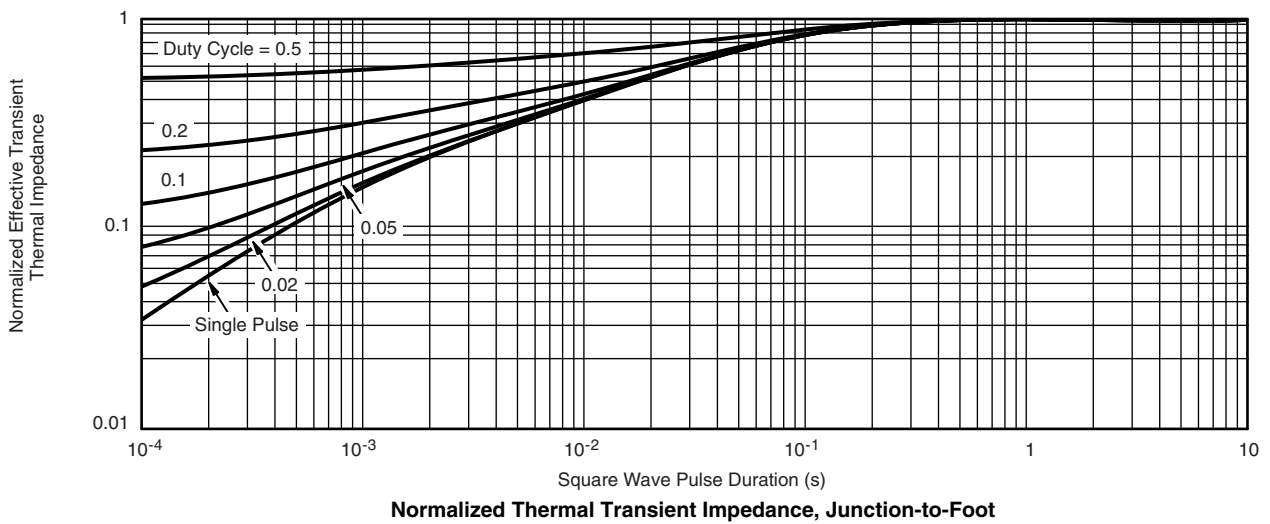
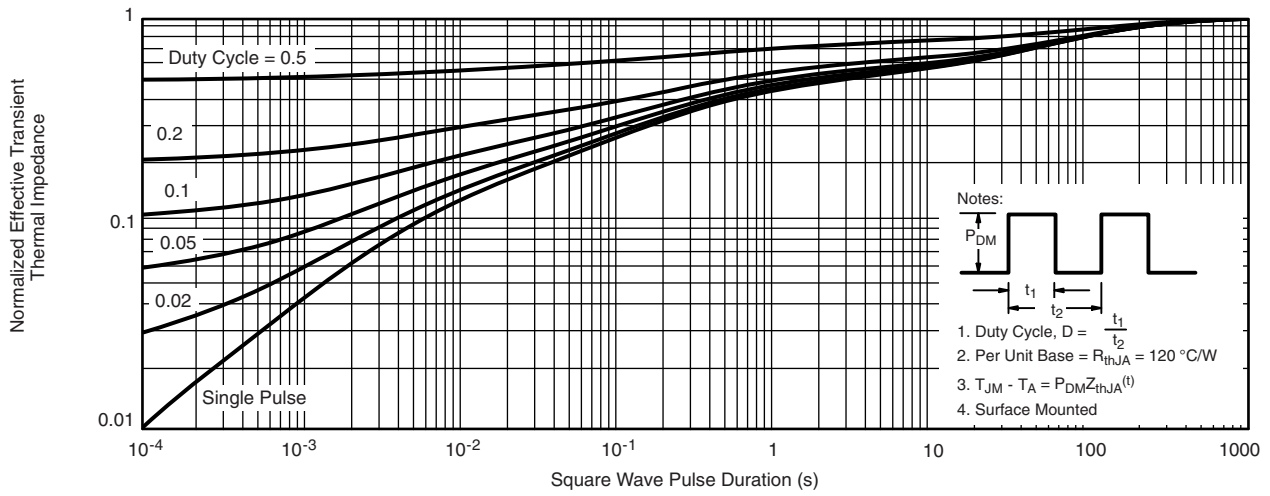
**Power Derating ( $T_C$ )**



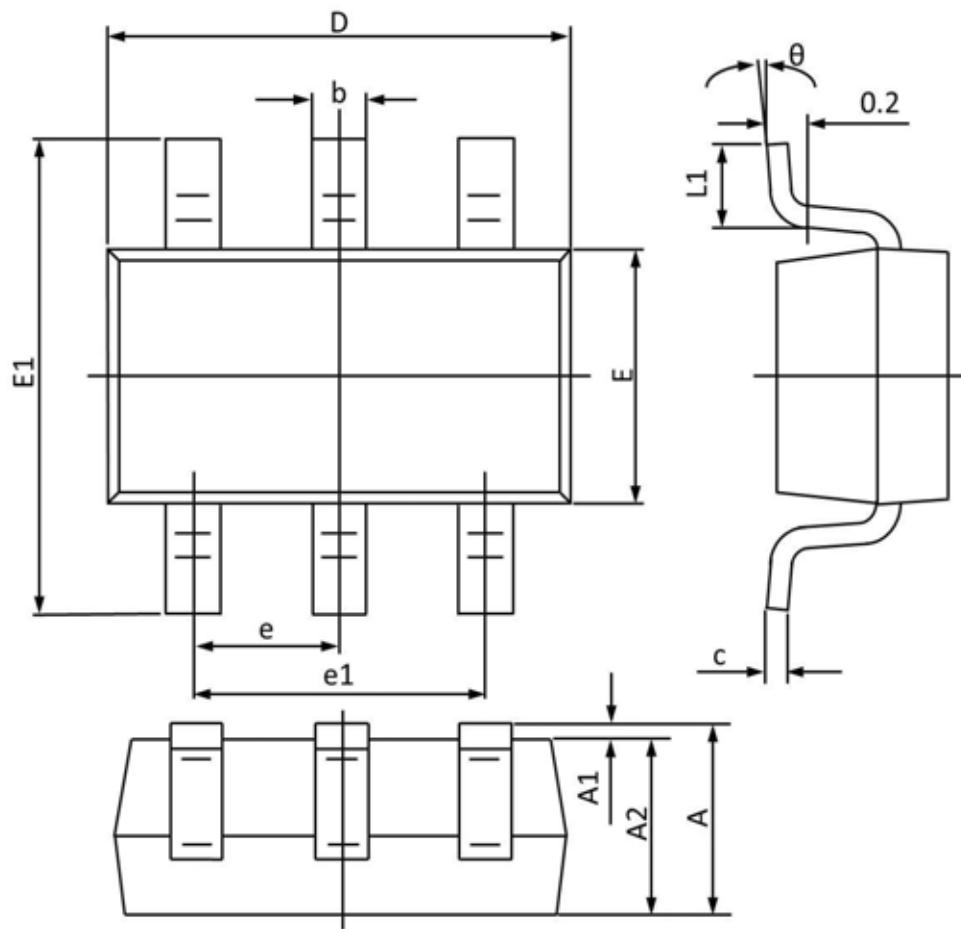
**Power Derating ( $T_A$ )**

\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150\text{ }^{\circ}\text{C}$ , using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

## RATING AND CHARACTERISTICS CURVES (RM6A5N30S6)



## SOT23-6 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | MAX                       | MIN   | MAX                  | MIN   |
| A      | 1.450                     | -     | 0.057                | -     |
| A1     | 0.100                     | 0.000 | 0.004                | 0.000 |
| A2     | 1.300                     | 1.050 | 0.051                | 0.041 |
| b      | 0.500                     | 0.300 | 0.020                | 0.012 |
| c      | 0.200                     | 0.100 | 0.008                | 0.004 |
| D      | 3.100                     | 2.700 | 0.122                | 0.106 |
| E      | 1.800                     | 1.400 | 0.071                | 0.055 |
| E1     | 3.000                     | 2.600 | 0.118                | 0.102 |
| e      | 0.95BSC                   |       | 0.037BSC             |       |
| e1     | 2.000                     | 1.800 | 0.079                | 0.071 |
| L1     | 0.600                     | 0.300 | 0.024                | 0.012 |
| θ      | 10°                       | 0°    | 10°                  | 0°    |

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