



MCR100-6 0.8A Sensitive SCR

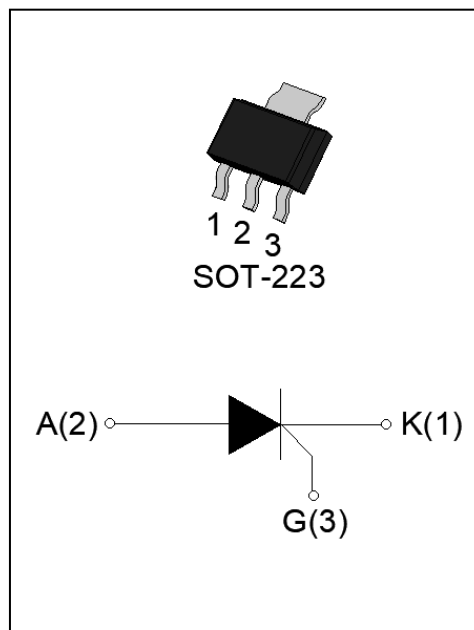
Rev.A.1.0

DESCRIPTION:

The MCR100-6 SCR provides high dV/dt rate with strong resistance to electromagnetic interface. It is especially recommended for use on residual current circuit breaker, straight hair, igniter etc. Package SOT-223 is RoHS compliant.

MAIN FEATURES

| Symbol | Value | Unit |
|---------------------|------------|---------|
| $I_{T(RMS)}$ | 0.8 | A |
| V_{DRM} / V_{RRM} | 800 | V |
| I_{GT} | ≤ 200 | μA |



ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Value | Unit |
|--|--------------|----------------------|-------------|
| Storage junction temperature range | T_{stg} | -40-150 | $^{\circ}C$ |
| Operating junction temperature range | T_j | -40-125 ^① | $^{\circ}C$ |
| Repetitive peak off-state voltage ($T_j=25^{\circ}C$) | V_{DRM} | 800 | V |
| Repetitive peak reverse voltage ($T_j=25^{\circ}C$) | V_{RRM} | 800 | V |
| Average on-state current ($T_c \leq 89^{\circ}C$) | $I_{T(AV)}$ | 0.5 | A |
| RMS on-state current ($T_c \leq 89^{\circ}C$) | $I_{T(RMS)}$ | 0.8 | A |
| Non repetitive surge peak on-state current ($t_p=10ms, T_j=25^{\circ}C$) | I_{TSM} | 8 | A |
| Non repetitive surge peak on-state current ($t_p=8.3ms, T_j=25^{\circ}C$) | | 9 | |
| I^2t value for fusing ($t_p=10ms, T_j=25^{\circ}C$) | I^2t | 0.32 | A^2s |
| Critical rate of rise of on-state current ($I_G=2 \times I_{GT}, f=100Hz, T_j=125^{\circ}C$) | di/dt | 50 | $A/\mu s$ |
| Peak gate current ($t_p=20\mu s, T_j=125^{\circ}C$) | I_{GM} | 1 | A |
| Average gate power dissipation ($T_j=125^{\circ}C$) | $P_{G(AV)}$ | 0.1 | W |

| | | | |
|--|----------|---|----|
| Peak gate power | P_{GM} | 2 | W |
| Peak pulse voltage ($T_j=25^{\circ}\text{C}$; non-repetitive, off-state; FIG.8) | V_{pp} | 1 | kV |

NOTE 1: When we parallel connect a $\leq 1\text{K}\Omega$ resistor between Gate and Cathode, the T_j can reach 125°C ; if without this resistor, the T_j only can reach 110°C .

ELECTRICAL CHARACTERISTICS ($T_j=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol | Test Condition | Value | | | Unit |
|-----------|--|-------|------|------|------------------------|
| | | MIN. | TYP. | MAX. | |
| I_{GT} | $V_D=12\text{V}$ $R_L=33\Omega$ | - | 50 | 200 | μA |
| V_{GT} | | - | 0.6 | 0.8 | V |
| V_{GD} | $V_D=V_{DRM}$ $T_j=125^{\circ}\text{C}$ | 0.2 | - | - | V |
| I_L | $I_G=1.2 I_{GT}$ | - | - | 4 | mA |
| I_H | $I_T=0.05\text{A}$ | - | - | 3 | mA |
| dV/dt | $V_D=540\text{V}$ $T_j=125^{\circ}\text{C}$ $R_{GK}=1\text{K}\Omega$ | 200 | - | - | $\text{V}/\mu\text{s}$ |
| | $V_D=540\text{V}$ $T_j=125^{\circ}\text{C}$ $R_{GK}=220\Omega$ | 500 | - | - | |
| t_{on} | $I_G=10\text{mA}$ $I_A=20\text{mA}$ $I_R=2\text{mA}$ | - | 2 | - | μs |
| t_{off} | $T_j=25^{\circ}\text{C}$ | - | 50 | - | μs |

STATIC CHARACTERISTICS

| Symbol | Parameter | | Value(MAX.) | Unit |
|-----------|--------------------------------------|---------------------------|-------------|---------------|
| V_{TM} | $I_T=1\text{A}$ $t_p=380\mu\text{s}$ | $T_j=25^{\circ}\text{C}$ | 1.35 | V |
| V_{TO} | Threshold voltage | $T_j=125^{\circ}\text{C}$ | 0.93 | V |
| R_D | Dynamic Resistance | $T_j=125^{\circ}\text{C}$ | 0.34 | Ω |
| I_{DRM} | $V_D=V_{DRM}$ $V_R=V_{RRM}$ | $T_j=25^{\circ}\text{C}$ | 2 | μA |
| I_{RRM} | | $T_j=125^{\circ}\text{C}$ | 0.2 | mA |

THERMAL RESISTANCES

| Symbol | Parameter | Value | Unit |
|---------------|--------------------------|-------|-----------------------------|
| $R_{th(j-c)}$ | junction to case (DC) | 35 | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | junction to ambient (DC) | 120 | $^{\circ}\text{C}/\text{W}$ |

MARKING

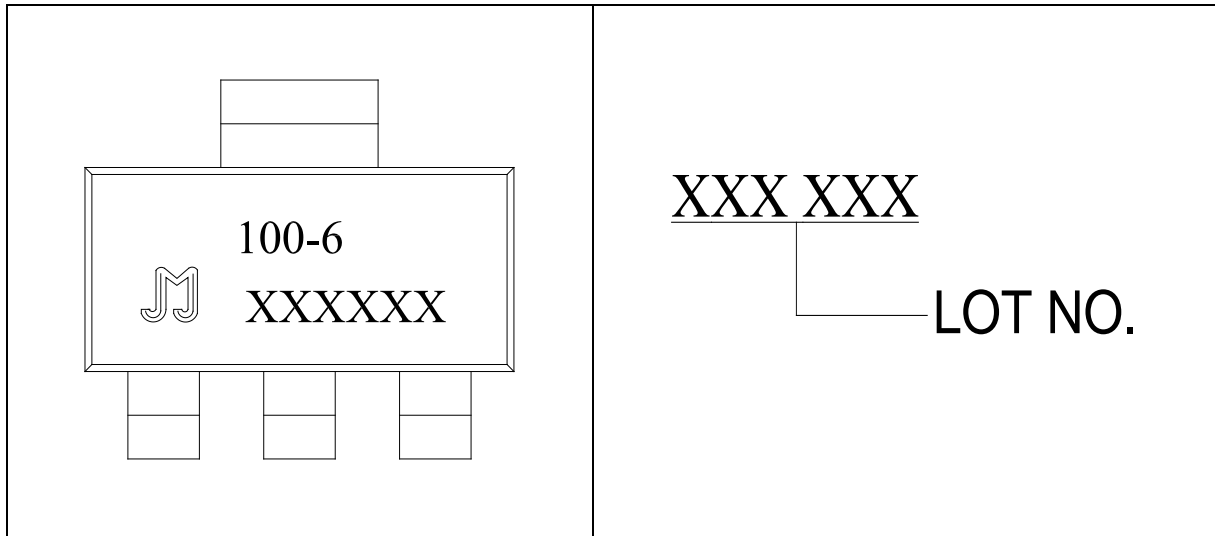


FIG.1 Maximum power dissipation versus RMS on-state current

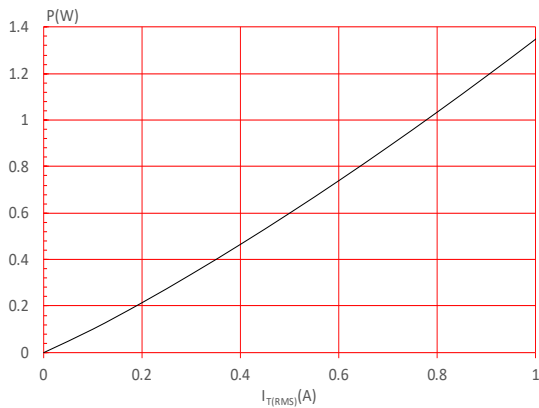


FIG.2: RMS on-state current versus case temperature

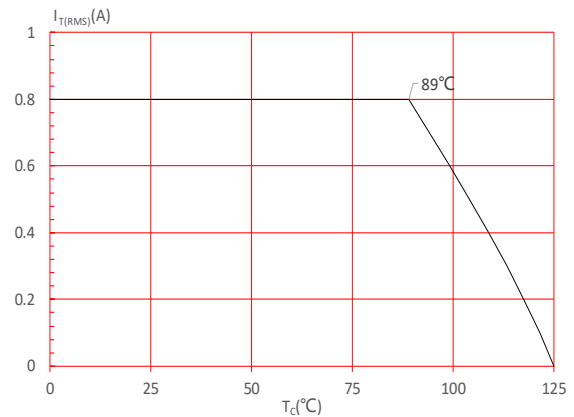


FIG.3: RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35 μ m)(full cycle)

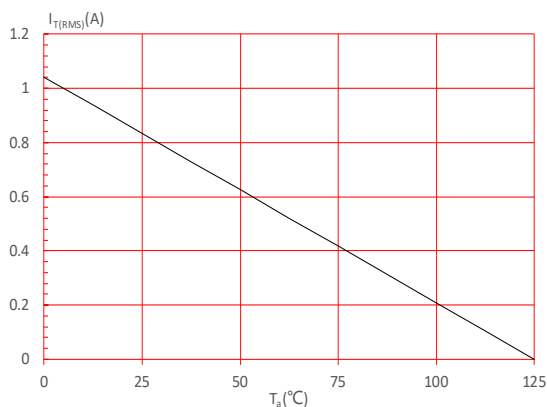


FIG.4: Surge peak on-state current versus number of cycles

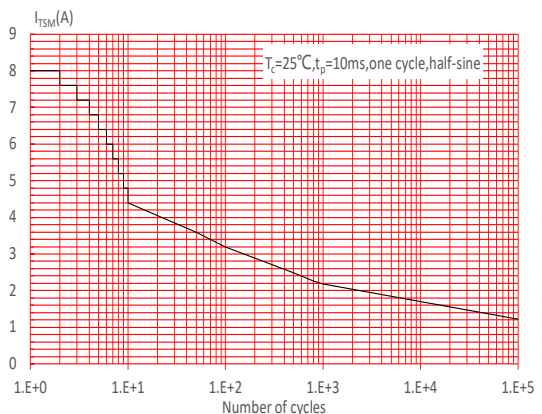


FIG.5: On-state characteristics

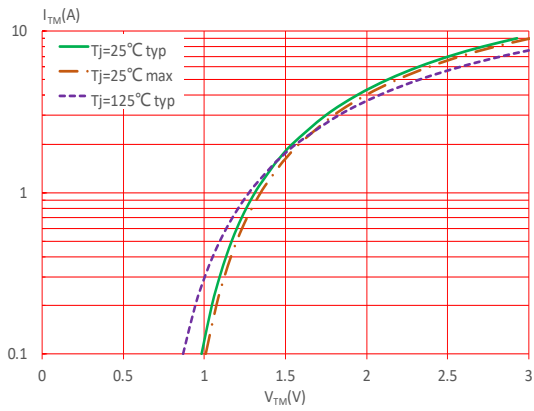


FIG.6: Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10\text{ms}$, and corresponding value of I^2t ($di/dt < 50\text{A}/\mu\text{s}$)

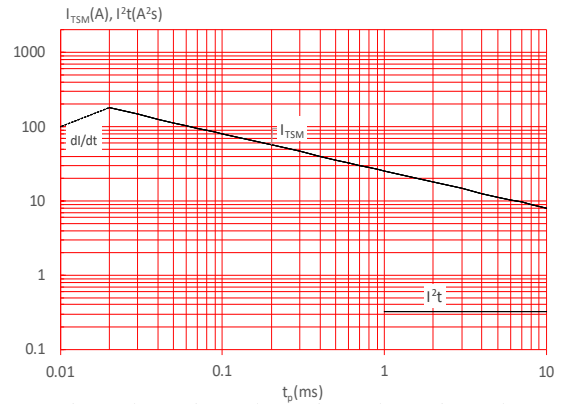


FIG.7: Relative variations of gate trigger current, holding current and latching current versus junction temperature

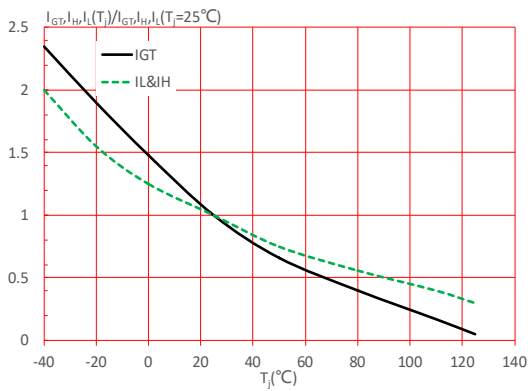
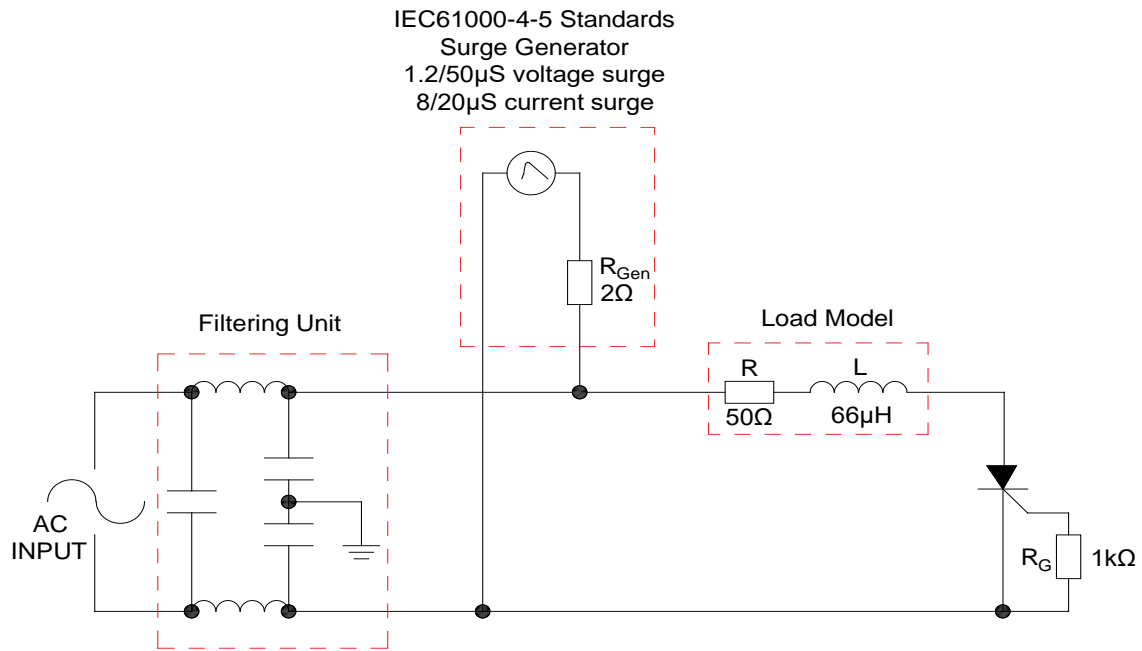
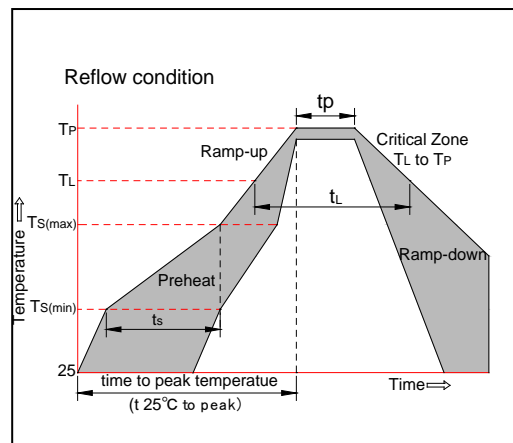


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards.



SOLDERING PARAMETERS

| | | |
|---|--------------------------------------|---|
| Reflow Condition | | Pb-Free assembly (see figure at right) |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +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/sec. Max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/sec. Max |
| Reflow | -Temperature(T_L) (Liquidus) | +217°C |
| | -Temperature(t_L) | 60-150 secs. |
| Peak Temp (T_p) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp (t_p) | | 20-40secs. |
| Ramp-down Rate | | 6°C/sec. Max |
| Time 25°C to Peak Temp (T_p) | | 8 min. Max |
| Do not exceed | | +260°C |



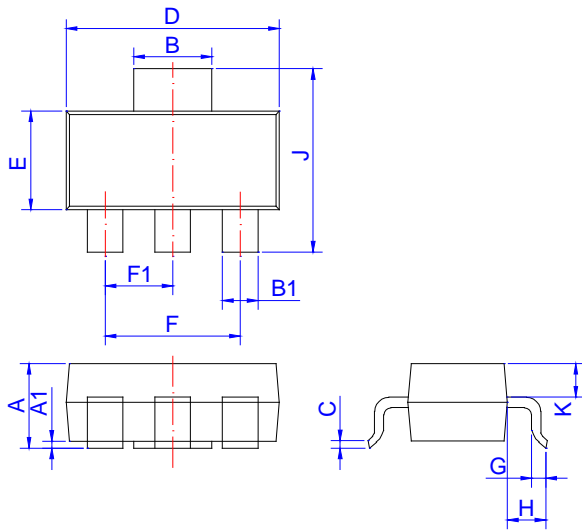
ORDERING INFORMATION

| Order code | Voltage V_{DRM}/V_{RRM} (V) | IGT(μ A) | Package | Base qty. (pcs) | Delivery mode |
|------------|----------------------------------|---------------|---------|--------------------|------------------|
| MCR100-6 | 800 | ≤ 200 | SOT-223 | 4,000 | Tape & Reel |

Document Revision History

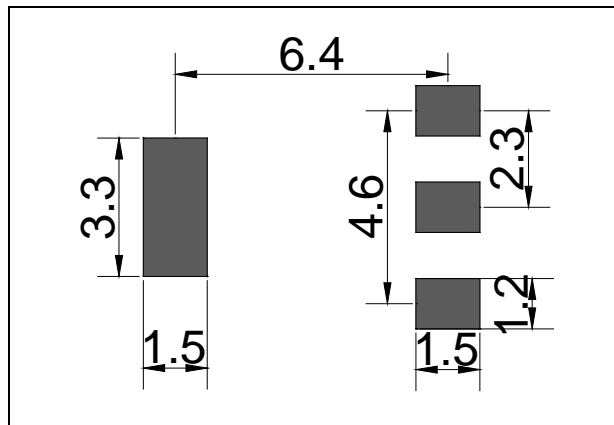
| Date | Revision | Changes |
|--------------|----------|-------------|
| May.19, 2023 | A.1.0 | Last update |

PACKAGE MECHANICAL DATA

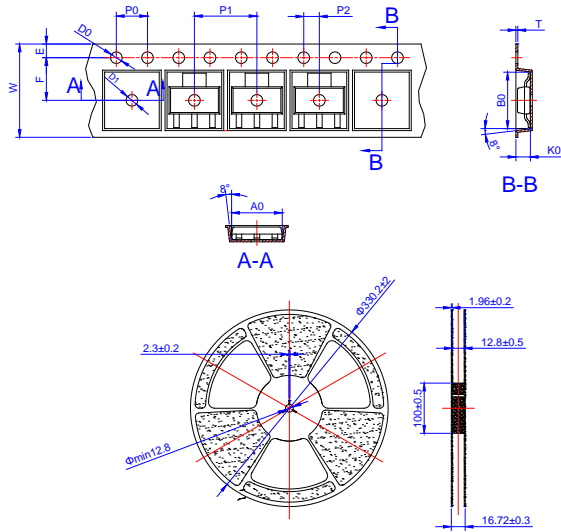


| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 1.5 | 1.6 | 1.8 | 0.059 | 0.063 | 0.071 |
| A1 | 0.01 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| B | 2.9 | 3.0 | 3.1 | 0.114 | 0.118 | 0.122 |
| B1 | 0.6 | 0.7 | 0.8 | 0.024 | 0.028 | 0.031 |
| C | 0.22 | 0.26 | 0.32 | 0.009 | 0.010 | 0.013 |
| D | 6.3 | 6.5 | 6.7 | 0.248 | 0.256 | 0.264 |
| E | 3.3 | 3.5 | 3.7 | 0.130 | 0.138 | 0.146 |
| F | 4.4 | | 4.8 | 0.173 | | 0.189 |
| F1 | 2.2 | | 2.4 | 0.087 | | 0.094 |
| G | 0.5 | | 1.0 | 0.020 | | 0.039 |
| H | 1.5 | 1.75 | 2.0 | 0.059 | 0.069 | 0.079 |
| J | 6.7 | 7.0 | 7.3 | 0.264 | 0.276 | 0.287 |
| K | 0.8 | 0.9 | 1.0 | 0.031 | 0.035 | 0.039 |

FOOTPRINT-SOT-223 (dimensions in mm)




DELIVERY MODE



| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| W | - | - | 12.30 | - | - | 0.482 |
| E | 1.65 | 1.75 | 1.85 | 0.065 | 0.069 | 0.073 |
| F | 5.45 | 5.50 | 5.55 | 0.215 | 0.217 | 0.219 |
| D0 | 1.50 | 1.55 | 1.60 | 0.059 | 0.061 | 0.063 |
| D1 | 1.50 | - | - | 0.059 | - | - |
| P0 | 3.90 | 4.00 | 4.10 | 0.154 | 0.157 | 0.161 |
| P1 | 7.90 | 8.00 | 8.10 | 0.311 | 0.315 | 0.319 |
| P2 | 1.95 | 2.00 | 2.05 | 0.077 | 0.079 | 0.081 |
| 10P0 | 39.80 | 40.00 | 40.20 | 1.567 | 1.575 | 1.583 |
| A0 | 6.85 | 6.95 | 7.05 | 0.269 | 0.273 | 0.276 |
| B0 | 7.15 | 7.25 | 7.35 | 0.280 | 0.284 | 0.288 |
| K0 | 1.95 | 2.05 | 2.15 | 0.076 | 0.080 | 0.084 |
| T | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |

| PACKAGE | OUTLINE | REEL (PCS) | PER CARTON (PCS) | TAPE & REEL |
|---------|---------|------------|------------------|-------------|
| SOT-223 | TAPING | 4,000 | 40,000 | 13 inch |

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