



LCR1655

55A Thyristor High Voltage, Phase Control SCR

Features

- 150 °C maximum operating junction temperature

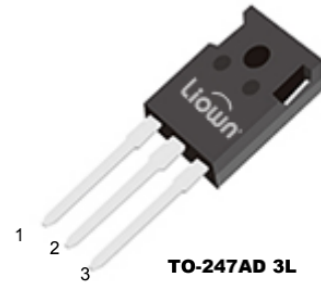
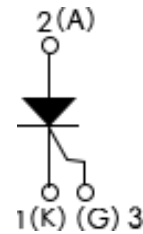
Applications

Typical usage is in input rectification crowbar (soft start) and AC switch motor control, UPS, welding, and battery charge.

Description

The LCR1655 high voltage series of silicon controlled rectifiers are specifically designed for medium power switching, and phase control applications. The glass passivation technology used, has reliable operation up to 150 °C junction temperature.

| | |
|-------------------|-----------------|
| $I_{T(AV)}$ | 55 A |
| V_{DRM}/V_{RRM} | 1600 V |
| I_{GT} | 20-60 mA |
| T_J | -40°C to +125°C |



| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|---|-------------|------------------|
| PARAMETER | TEST CONDITIONS | VALUES | UNITS |
| V_{RRM}/V_{DRM} | | 1600 | V |
| V_T | 50 A, $T_J = 125\text{ }^\circ\text{C}$ | 1.4 | |
| $I_{T(AV)}$ | | 55 | A |
| I_{RMS} | | 80 | |
| I_{TSM} | | 800 | |
| dV/dt | | 1000 | V/ μs |
| T_J, T_{Stg} | | -40 to +125 | $^\circ\text{C}$ |

| ABSOLUTE MAXIMUM RATINGS | | | | | | |
|--|-------------------|---|-----------------------------|--------|--------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | | UNITS |
| | | | | TYP. | MAX. | |
| Maximum average on-state current | $I_{T(AV)}$ | $T_C = 112\text{ }^\circ\text{C}$, 180° conduction half sine wave | | - | 55 | A |
| Maximum continuous RMS on-state current as AC switch | $I_{T(RMS)}$ | | | - | 80 | |
| Peak, one-cycle non-repetitive surge current | I_{TSM} | 10 ms sine pulse, rated V_{RRM} applied | Initial $T_J = T_J$ maximum | - | 800 | |
| | | 10 ms sine pulse, no voltage reapplied | | - | 630 | |
| I^2t for fusing | I^2t | 10 ms sine pulse, rated V_{RRM} applied | | - | 1405 | A^2s |
| | | 10 ms sine pulse, no voltage reapplied | | - | 1986 | |
| $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | $t = 0.1\text{ ms to }10\text{ ms}$, no voltage reapplied, $T_J = 125\text{ }^\circ\text{C}$ | | - | 19 850 | $A^2\sqrt{s}$ |
| Low level value of threshold voltage | $V_{T(TO)1}$ | $T_J = 125\text{ }^\circ\text{C}$ | | - | 0.89 | V |
| High level value of threshold voltage | $V_{T(TO)2}$ | | | - | 0.97 | |
| Low level value of on-state slope resistance | r_{t1} | | | - | 6.77 | $m\Omega$ |
| High level value of on-state slope resistance | r_{t2} | | | - | 6.32 | |
| On-state voltage | V_T | 50 A, $T_J = 25\text{ }^\circ\text{C}$ | | 1.2 | 1.4 | V |
| | | 100 A, $T_J = 25\text{ }^\circ\text{C}$ | | 1.4 | 1.6 | |
| Rate of rise of turned-on current | di/dt | $T_J = 25\text{ }^\circ\text{C}$ | | - | 150 | $A/\mu s$ |
| Holding current | I_H | Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$ | | - | 300 | mA |
| Latching current | I_L | | | - | 350 | |
| Reverse and direct leakage current | I_{RRM}/I_{DRM} | $T_J = 25\text{ }^\circ\text{C}$ | | - | 0.05 | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | - | 10 | |
| Rate of rise of off-state voltage | dV/dt | $T_J = T_J$ maximum, linear to 80 % V_{DRM} , $R_g-k = \infty\ \Omega$ | | - | 1000 | $V/\mu s$ |

| TRIGGERING | | | | | | |
|-------------------------------------|-------------|--|-----------------------------------|--------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | | UNITS |
| | | | | TYP. | MAX. | |
| Peak gate power | P_{GM} | 10 ms sine pulse, no voltage reapplied | | - | 10 | W |
| Average gate power | $P_{G(AV)}$ | | | - | 2.5 | |
| Peak gate current | I_{GM} | | | - | 2.5 | A |
| Peak negative gate voltage | $-V_{GM}$ | | | - | 10 | V |
| Required DC gate voltage to trigger | V_{GT} | $T_J = -40\text{ }^\circ\text{C}$ | Anode supply = 6 V resistive load | - | 1.6 | |
| | | $T_J = 25\text{ }^\circ\text{C}$ | | - | 1.5 | |
| | | $T_J = 150\text{ }^\circ\text{C}$ | | - | 1 | |
| Required DC gate to trigger | I_{GT} | $T_J = -40\text{ }^\circ\text{C}$ | Anode supply = 6 V resistive load | - | 160 | mA |
| | | $T_J = 25\text{ }^\circ\text{C}$ | | 20 | 60 | |
| | | $T_J = 150\text{ }^\circ\text{C}$ | | - | 60 | |
| DC gate voltage not to trigger | V_{GD} | $T_J = 150\text{ }^\circ\text{C}$, $V_{DRM} = \text{rated value}$ | | - | 0.2 | V |
| DC gate current not to trigger | I_{GD} | | | - | 3 | mA |

| SWITCHING | | | | |
|---------------|----------|---|--------|---------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Turn-on time | t_{gt} | $I_T = 50\text{ A}$, $V_D = 50\% V_{DRM}$, $I_{gt} = 300\text{ mA}$, $T_J = 25\text{ }^\circ\text{C}$ | 1.5 | μs |
| Turn-off time | t_q | $I_T = 50\text{ A}$, $V_D = 80\% V_{DRM}$, $dV/dt = 20\text{ V}/\mu s$, $t_p = 200\ \mu s$, $I_{gt} = 100\text{ mA}$, $di/dt = 10\text{ A}/\mu s$, $V_R = 100\text{ V}$, $T_J = 150\text{ }^\circ\text{C}$ | 92 | |

| THERMAL AND MECHANICAL SPECIFICATIONS | | | | | |
|---|----------------|---------------------------------------|----------|------|---------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | TYP. | MAX. | UNITS |
| Maximum junction and storage temperature range | T_J, T_{Stg} | | -40 | 125 | °C |
| Maximum thermal resistance, junction to case | R_{thJC} | | - | 0.35 | °C/W |
| Maximum thermal resistance, junction to ambient | R_{thJA} | | - | 40 | |
| Typical thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth, and greased | 0.2 | - | |
| Mounting torque | minimum | | 6 (5) | | kgf · cm (lbf · in) |
| | maximum | | 12 (10) | | |
| Marking device | | Case style Super TO-247AD 3L | 50TPS12L | | |

| ΔR_{thJ-HS} CONDUCTION PER JUNCTION | | | | | | | | | | | |
|---|---------------------------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|-------|-------|
| DEVICE | SINE HALF-WAVE CONDUCTION | | | | | RECTANGULAR WAVE CONDUCTION | | | | | UNITS |
| | 180° | 120° | 90° | 60° | 30° | 180° | 120° | 90° | 60° | 30° | |
| VS-50TPS12L-M3 | 0.143 | 0.166 | 0.208 | 0.299 | 0.490 | 0.099 | 0.168 | 0.223 | 0.311 | 0.494 | °C/W |

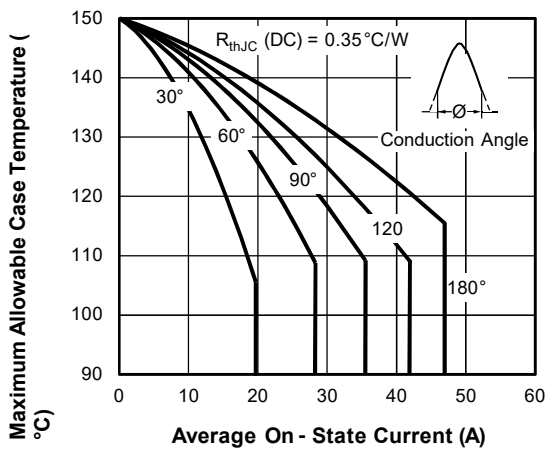


Fig. 1 - Current Rating Characteristics

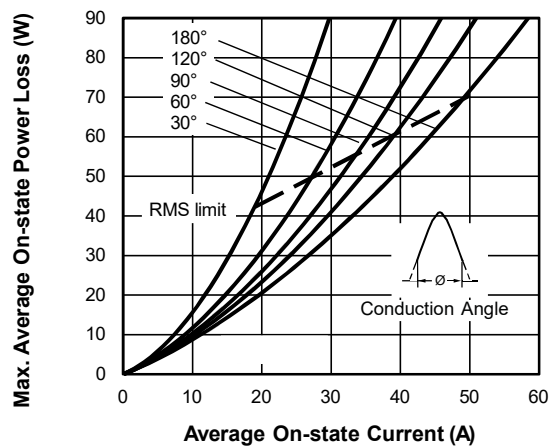


Fig. 3 - On-State Power Loss Characteristics

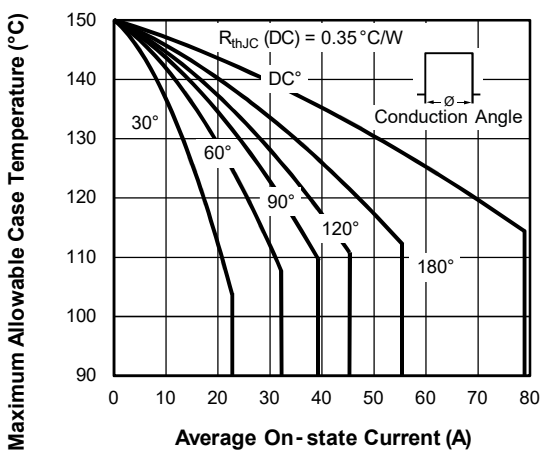


Fig. 2 - Current Rating Characteristics

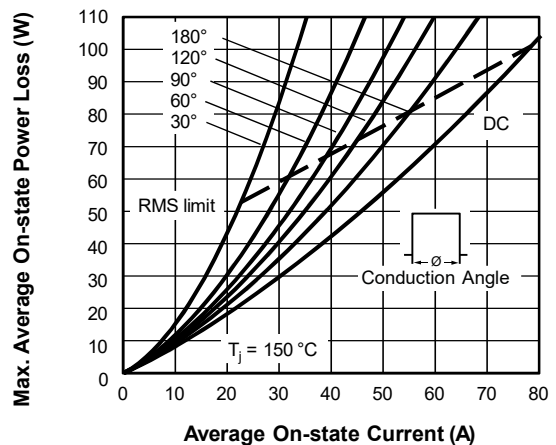


Fig. 4 - On-State Power Loss Characteristics

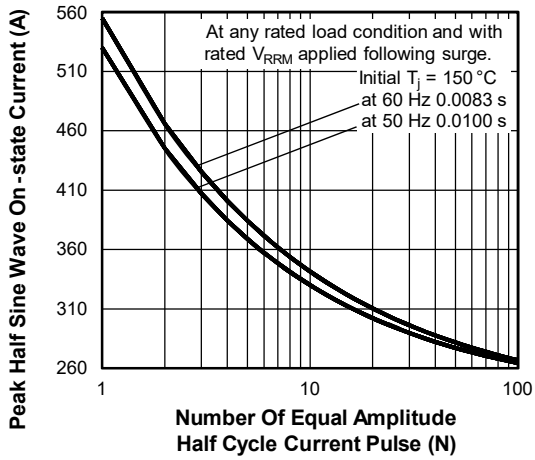


Fig. 5 - Maximum Non-Repetitive Surge Current

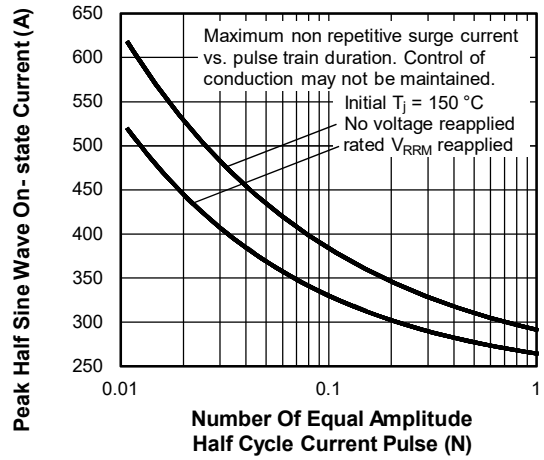


Fig. 6 - Maximum Non-Repetitive Surge Current

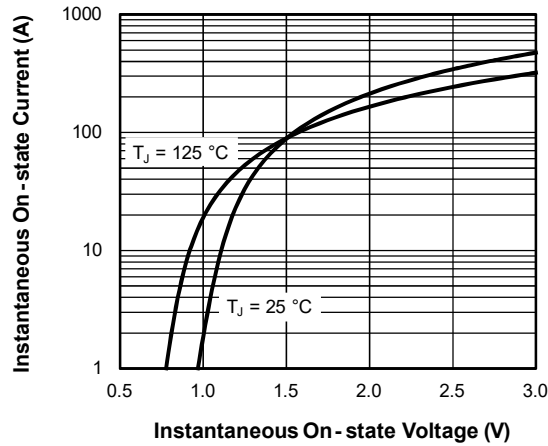


Fig. 7 - On-State Voltage Drop Characteristics

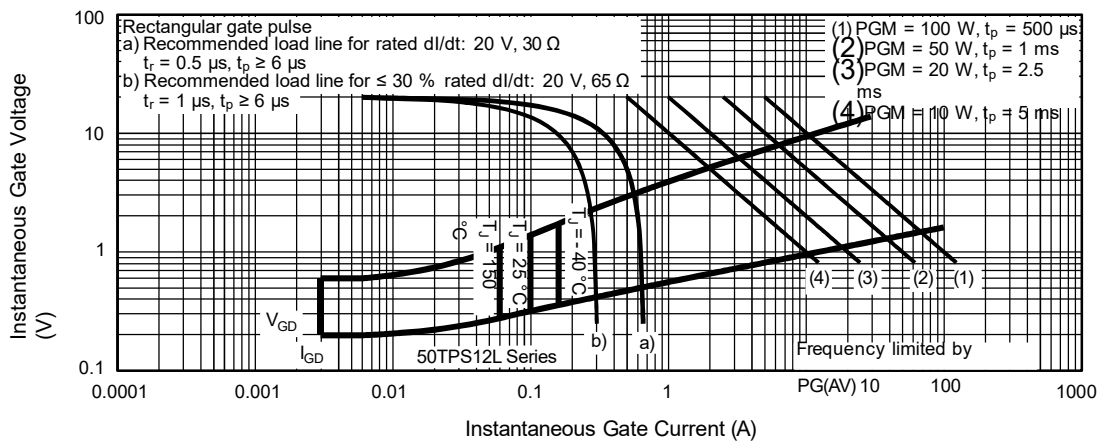
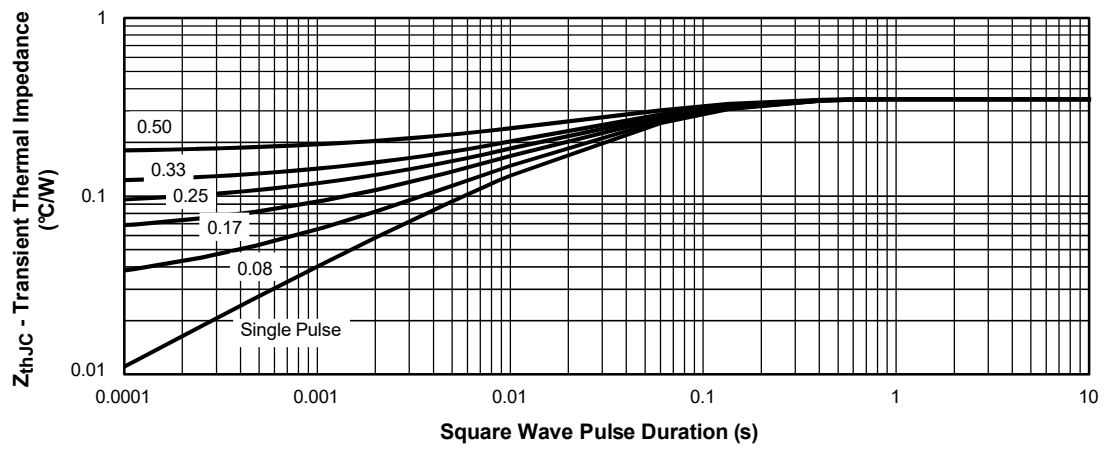
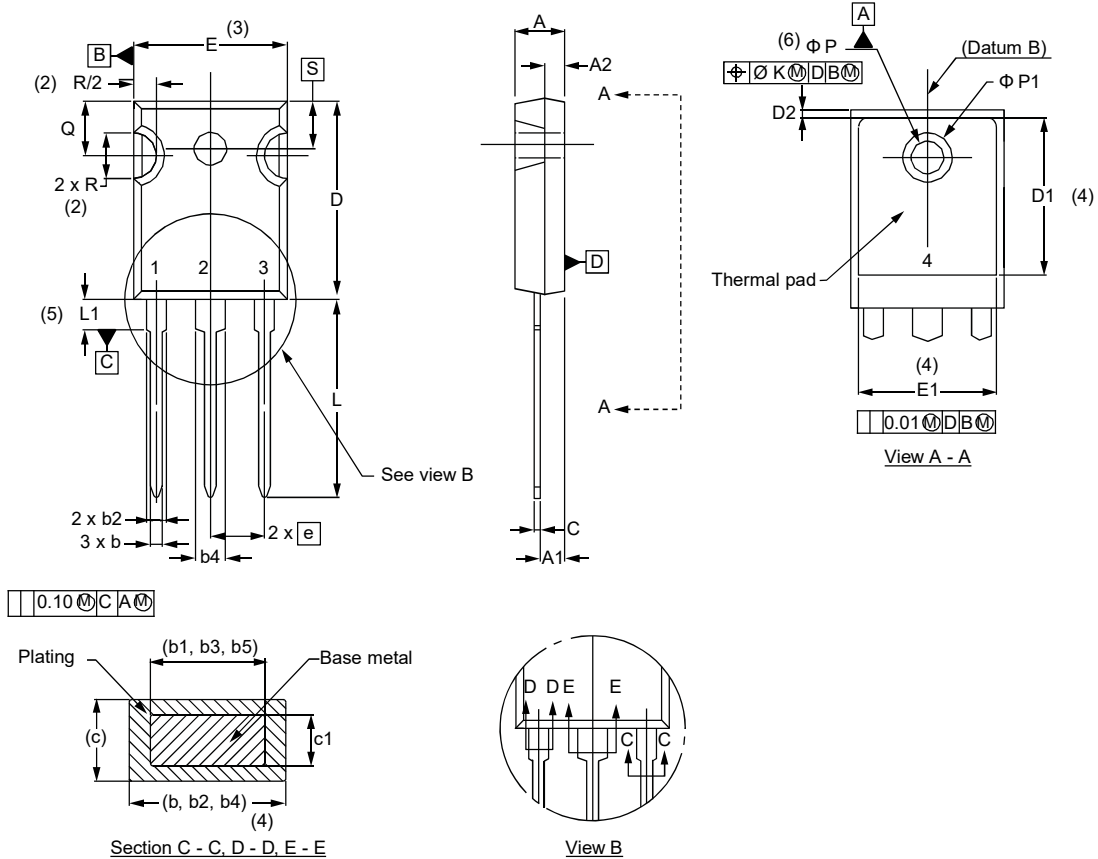


Fig. 8 - Gate Characteristics



TO-247AD 3L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.65 | 5.31 | 0.183 | 0.209 | |
| A1 | 2.21 | 2.59 | 0.087 | 0.102 | |
| A2 | 1.50 | 2.49 | 0.059 | 0.098 | |
| b | 0.99 | 1.40 | 0.039 | 0.055 | |
| b1 | 0.99 | 1.35 | 0.039 | 0.053 | |
| b2 | 1.65 | 2.39 | 0.065 | 0.094 | |
| b3 | 1.65 | 2.34 | 0.065 | 0.092 | |
| b4 | 2.59 | 3.43 | 0.102 | 0.135 | |
| b5 | 2.59 | 3.38 | 0.102 | 0.133 | |
| c | 0.38 | 0.89 | 0.015 | 0.035 | |
| c1 | 0.38 | 0.84 | 0.015 | 0.033 | |
| D | 19.71 | 20.70 | 0.776 | 0.815 | 3 |
| D1 | 13.08 | - | 0.515 | - | 4 |

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| D2 | 0.51 | 1.30 | 0.020 | 0.051 | |
| E | 15.29 | 15.87 | 0.602 | 0.625 | 3 |
| E1 | 13.46 | - | 0.53 | - | |
| e | 5.46 BSC | | 0.215 BSC | | |
| Ø K | 2.54 | | 0.010 | | |
| L | 19.81 | 20.32 | 0.780 | 0.800 | |
| L1 | 3.71 | 4.29 | 0.146 | 0.169 | |
| Ø P | 3.56 | 3.66 | 0.14 | 0.144 | |
| Ø P1 | - | 6.98 | - | 0.275 | |
| R | 4.52 | 5.49 | 0.178 | 0.216 | |
| S | 5.51 BSC | | 0.217 BSC | | |