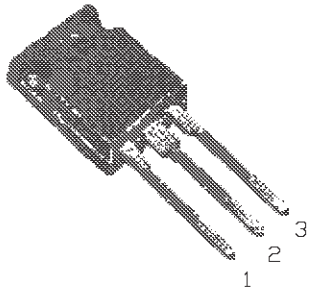
# STY16NA90

## N - CHANNEL 900V - 0.5 Ω - 16A - Max247
## EXTREMELY LOW GATE CHARGE POWER MOSFET

**PRELIMINARY DATA**

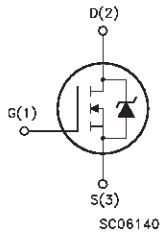
| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| STY16NA90 | 900 V | < 0.54 Ω | 16 A |

- TYPICAL $R_{DS(on)}$ = 0.5 Ω
- EFFICIENT AND RELIABLE MOUNTING THROUGH CLIP
- ± 30V GATE TO SOURCE VOLTAGE RATING
- REPETITIVE AVALANCHE TESTED
- LOW INTRINSIC CAPACITANCE
- 100% AVALANCHE TESTED
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD




**Max247**™

**INTERNAL SCHEMATIC DIAGRAM**




### DESCRIPTION

The Max247™ package is a new high volume power package exibiting the same footprint as the industry standard TO-247, but designed to accomodate much larger silicon chips, normally supplied in bigger packages such as TO-264. The increased die capacity makes the device ideal to reduce component count in multiple paralleled designs and save board space with respect to larger packages.

### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES (UPS)

### ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source Voltage ($V_{GS}$ = 0) | 900 | V |
| $V_{DGR}$ | Drain- gate Voltage ($R_{GS}$ = 20 kΩ) | 900 | V |
| $V_{GS}$ | Gate-source Voltage | ± 30 | V |
| $I_D$ | Drain Current (continuous) at $T_c$ = 25 °C | 16 | A |
| $I_D$ | Drain Current (continuous) at $T_c$ = 100 °C | 10 | A |
| $I_{DM}$(•) | Drain Current (pulsed) | 64 | A |
| $P_{tot}$ | Total Dissipation at $T_c$ = 25 °C | 300 | W |
| | Derating Factor | 2.4 | W/°C |
| $T_{stg}$ | Storage Temperature | -55 to 150 | °C |
| $T_j$ | Max. Operating Junction Temperature | 150 | °C |

(•) Pulse width limited by safe operating area

## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-case | Max | 0.42 | $^oC/W$ |
| $R_{thj\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 40 | $^oC/W$ |
| $R_{thc\text{-}sink}$ | Thermal Resistance Case-Heatsink with Conductive Grease | Typ | 0.05 | |

## AVALANCHE CHARACTERISTICS

| Symbol | Parameter | Max Value | Unit |
|---|---|---|---|
| $I_{AR}$ | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by $T_j$ max) | 16 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy (starting $T_j$ = 25 $^oC$, $I_D = I_{AR}$, $V_{DD}$ = 50 V) | 3000 | mJ |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25 $^oC$ unless otherwise specified)

OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D$ = 250 µA $V_{GS}$ = 0 | 900 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{GS}$ = 0)<br>$V_{DS}$ = Max Rating<br>$V_{DS}$ = Max Rating $T_c$ = 125 $^oC$ | | | | 50<br>500 | µA<br>µA |
| $I_{GSS}$ | Gate-body Leakage Current ($V_{DS}$ = 0) | $V_{GS}$ = ± 30 V | | | ± 100 | nA |

ON (*)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$ $I_D$ = 250 µA | 2.25 | 3 | 3.75 | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS}$ = 10 V $I_D$ = 8 A | | 0.5 | 0.54 | Ω<br>Ω |
| $I_{D(on)}$ | On State Drain Current | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$<br>$V_{GS}$ = 10 V | 16 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $g_{fs}$ (*) | Forward Transconductance | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D$ = 8 A | 15 | | | S |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$ | Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance | $V_{DS}$ = 25 V f = 1 MHz $V_{GS}$ = 0 | | 6400<br>600<br>150 | 8300<br>750<br>200 | pF<br>pF<br>pF |

**ELECTRICAL CHARACTERISTICS** (continued)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$<br>$t_r$ | Turn-on Time<br>Rise Time | $V_{DD}$ = 450 V $I_D$ = 8 A<br>$R_G$ = 4.7 Ω $V_{GS}$ = 10 V | | 30<br>30 | | ns<br>ns |
| $Q_g$<br>$Q_{gs}$<br>$Q_{gd}$ | Total Gate Charge<br>Gate-Source Charge<br>Gate-Drain Charge | $V_{DD}$ = 720 V $I_D$ = 16 A $V_{GS}$ = 10 V | | 245<br>25<br>110 | 320 | nC<br>nC<br>nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{r(Voff)}$<br>$t_f$<br>$t_c$ | Off-voltage Rise Time<br>Fall Time<br>Cross-over Time | $V_{DD}$ = 720 V $I_D$ = 16 A<br>$R_G$ = 4.7 Ω $V_{GS}$ = 10 V | | 80<br>25<br>115 | 105<br>35<br>150 | ns<br>ns<br>ns |

SOURCE DRAIN DIODE

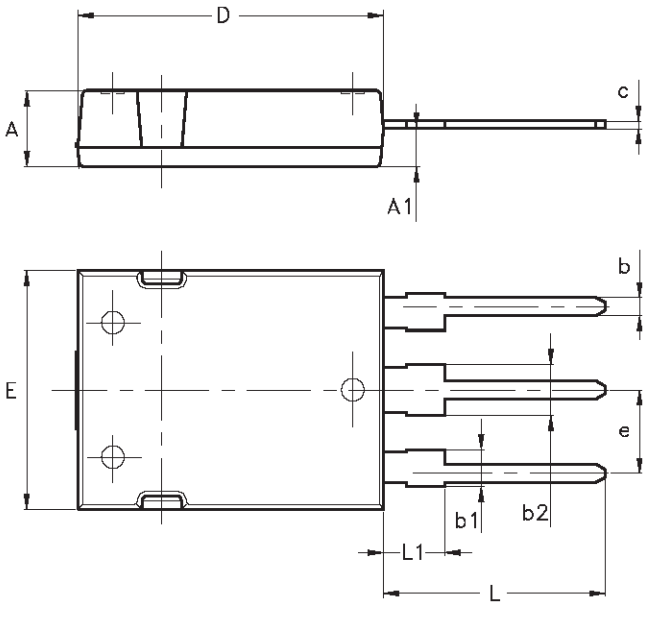
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$<br>$I_{SDM}$(•) | Source-drain Current<br>Source-drain Current (pulsed) | | | | 16<br>64 | A<br>A |
| $V_{SD}$ (∗) | Forward On Voltage | $I_{SD}$ = 16 A $V_{GS}$ = 0 | | | 2 | V |
| $t_{rr}$<br>$Q_{rr}$<br>$I_{RRM}$ | Reverse Recovery Time<br>Reverse Recovery Charge<br>Reverse Recovery Current | $I_{SD}$ = 16 A di/dt = 100 A/µs<br>$V_{DD}$ = 100 V $T_j$ = 150 °C | | 1100<br>25.3<br>46 | | ns<br>µC<br>A |

(∗) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

(•) Pulse width limited by safe operating area

## Max247 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.70 | | 5.30 | | | |
| A1 | 2.20 | | 2.60 | | | |
| b | 1.00 | | 1.40 | | | |
| b1 | 2.00 | | 2.40 | | | |
| b2 | 3.00 | | 3.40 | | | |
| c | 0.40 | | 0.80 | | | |
| D | 19.70 | | 20.30 | | | |
| e | 5.35 | | 5.55 | | | |
| E | 15.30 | | 15.90 | | | |
| L | 14.20 | | 15.20 | | | |
| L1 | 3.70 | | 4.30 | | | |

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