

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

DESCRIPTION

The Max247™ package is a new high volume power package exhibiting the same footprint as the industry standard TO-247, but designed to accommodate 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.

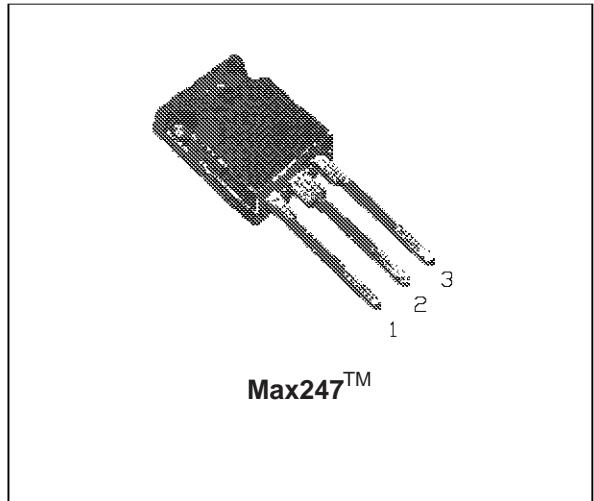
APPLICATIONS

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

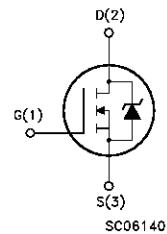
ABSOLUTE MAXIMUM RATINGS

| 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



INTERNAL SCHEMATIC DIAGRAM



STY16NA90

THERMAL DATA

| | | | | |
|-----------------------|--|-----|------|------|
| R _{thj-case} | Thermal Resistance Junction-case | Max | 0.42 | °C/W |
| R _{thj-amb} | Thermal Resistance Junction-ambient | Max | 40 | °C/W |
| R _{thc-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 °C, I _D = I _{AR} , V _{DD} = 50 V) | 3000 | mJ |

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C 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) | V _{DS} = Max Rating V _{DS} = Max Rating T _c = 125 °C | | | 50 500 | μA 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 _{DSS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V I _D = 8 A | | 0.5 | 0.54 | Ω Ω |
| I _{D(on)} | On State Drain Current | V _{DS} > I _{D(on)} × R _{DSS(on)max} V _{GS} = 10 V | 16 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--|---|---|------|--------------------|--------------------|----------------|
| g _{fs} (*) | Forward Transconductance | V _{DS} > I _{D(on)} × R _{DSS(on)max} I _D = 8 A | 15 | | | S |
| C _{iss} C _{oss} C _{rss} | Input Capacitance Output Capacitance Reverse Transfer Capacitance | V _{DS} = 25 V f = 1 MHz V _{GS} = 0 | | 6400 600 150 | 8300 750 200 | pF pF pF |

ELECTRICAL CHARACTERISTICS (continued)
SWITCHING ON

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

SWITCHING OFF

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

SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|--|------|--------------------|----------|--------------------------|
| I_{SD} $I_{SDM}(\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 16 64 | A A |
| $V_{SD} (\ast)$ | Forward On Voltage | $I_{SD} = 16 \text{ A}$ $V_{GS} = 0$ | | | 2 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 16 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 100 \text{ V}$ $T_j = 150 \text{ }^\circ\text{C}$ | | 1100 25.3 46 | | ns μC A |

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %
 (•) Pulse width limited by safe operating area