

N - CHANNEL 1000V - 0.65 Ω - 15A - Max247 MOSFET

PRELIMINARY DATA

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|------------|------------------|---------------------|----------------|
| STY15NA100 | 1000 V | < 0.77 Ω | 15 A |

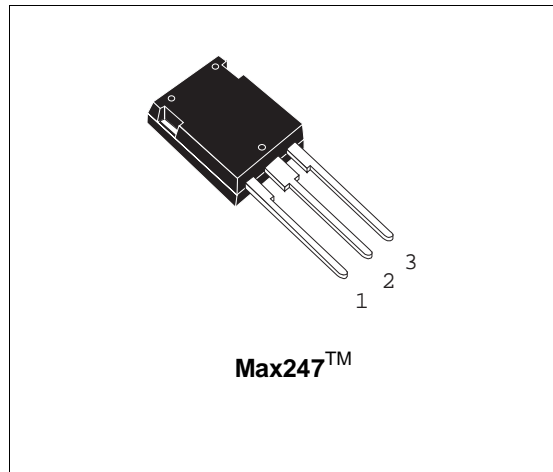
- TYPICAL R_{DS(on)} = 0.65 Ω
- EFFICIENT AND RELIABLE MOUNTING THROUGH CLIP
- ± 30V GATE TO SOURCE VOLTAGE RATING
- REPETITIVE AVALANCHE TESTED
- LOW INTRINSIC CAPACITANCE
- 100% AVALANCHE TESTED
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

DESCRIPTION

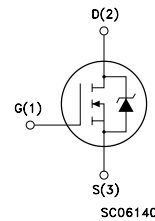
The Max247™ package is a new high volume power package exhibiting the same footprint as the industry standard TO-247, but designed to accommodate much larger silicon chips, normally supplied in bigger packages such as TO-264. The increased die capacity makes the device ideal to reduce component count 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)



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|---|------------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 1000 | V |
| V _{DGR} | Drain- gate Voltage (R _{GS} = 20 kΩ) | 1000 | V |
| V _{GS} | Gate-source Voltage | ± 30 | V |
| I _D | Drain Current (continuous) at T _c = 25 °C | 15 | A |
| I _D | Drain Current (continuous) at T _c = 100 °C | 9.5 | A |
| I _{DM} (•) | Drain Current (pulsed) | 60 | 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

STY15NA100

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) | 15 | 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 | 1000 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current (V _{GS} = 0) | V _{DS} = Max Rating V _{DS} = Max Rating x 0.8 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 _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V I _D = 7.5 A | | 0.65 | 0.77 | Ω Ω |
| I _{D(on)} | On State Drain Current | V _{DS} > I _{D(on)} × R _{DS(on)max} V _{GS} = 10 V | 15 | | | A |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--|--|--|------|--------------------|------|----------------|
| g _{fs} (*) | Forward Transconductance | V _{DS} > I _{D(on)} × R _{DS(on)max} I _D = 7.5 A | 12 | | | S |
| C _{iss} C _{oss} C _{rss} | Input Capacitance Output Capacitance Reverse Transfer Capacitance | V _{DS} = 25 V f = 1 MHz V _{GS} = 0 | | 7000 600 150 | | 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 | $V_{DD} = 500\text{ V}$ $R_G = 4.7\ \Omega$ $I_D = 7.5\text{ A}$ $V_{GS} = 10\text{ V}$ | | 40 55 | | ns ns |
| $(di/dt)_{on}$ | Turn-on Current Slope | $V_{DD} = 800\text{ V}$ $R_G = 47\ \Omega$ $I_D = 15\text{ A}$ $V_{GS} = 10\text{ V}$ | | 260 | | A/ μ s |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD} = 800\text{ V}$ $I_D = 15\text{ A}$ $V_{GS} = 10\text{ V}$ | | 470 45 150 | 320 | nC nC nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|---|---|------|------------------|------|----------------|
| $t_{r(Voff)}$ t_f t_c | Off-voltage Rise Time Fall Time Cross-over Time | $V_{DD} = 800\text{ V}$ $R_G = 4.7\ \Omega$ $I_D = 15\text{ A}$ $V_{GS} = 10\text{ V}$ | | 110 25 150 | | 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) | | | | 15 60 | A A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 15\text{ A}$ $V_{GS} = 0$ | | | 2 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 15\text{ A}$ $V_{DD} = 100\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$ $T_j = 150\text{ }^\circ\text{C}$ | | 1400 42 60 | | ns μ C A |

(*) Pulsed: Pulse duration = 300 μ s, duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

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