

N - CHANNEL ENHANCEMENT MODE FAST POWER MOS TRANSISTOR

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STY30NA50	500 V	< 0.175 Ω	30 A

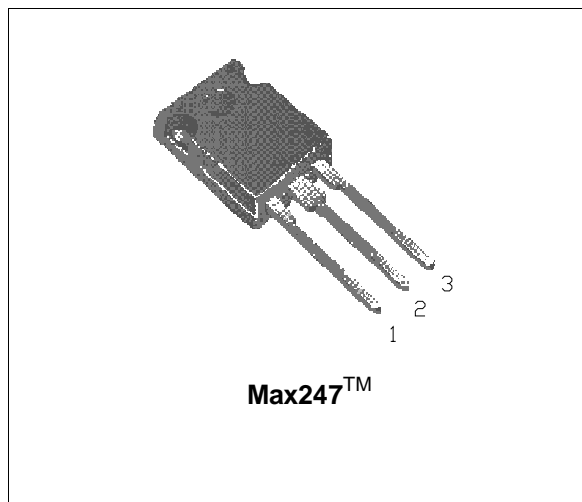
- TYPICAL R_{DS(on)} = 0.15 Ω
- EFFICIENT AND RELIABLE MOUNTING THROUGH CLIP
- ± 30V GATE TO SOURCE VOLTAGE RATING
- REPETITIVE AVALANCHE TESTED
- LOW INTRINSIC CAPACITANCE
- 100% AVALANCHE TESTED
- GATE CHARGE MINIMIZED
- REDUCED THRESHOLD VOLTAGE SPREAD

DESCRIPTION

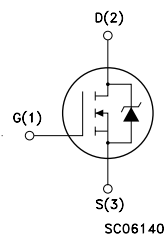
The Max247™ package is a new high volume power package exhibiting the same footprint as the industry standard TO-247, but designed to accommodate much larger silicon chips, normally supplied in bigger packages such as TO-264. The increased die capacity makes the device ideal to reduce component count 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)	500	V
V _{DGR}	Drain- gate Voltage (R _{GS} = 20 kΩ)	500	V
V _{GS}	Gate-source Voltage	± 30	V
I _D	Drain Current (continuous) at T _c = 25 °C	30	A
I _D	Drain Current (continuous) at T _c = 100 °C	19	A
I _{DM} (•)	Drain Current (pulsed)	120	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

STY30NA50

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, $\delta < 1\%$)	30	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	3000	mJ
E _{AR}	Repetitive Avalanche Energy (pulse width limited by T _j max, $\delta < 1\%$)	180	mJ
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (T _c = 100 °C, pulse width limited by T _j max, $\delta < 1\%$)	19	A

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 μ A V _{GS} = 0	500			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			200 1000	μ A μ A
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 μ A	2.25	3	3.75	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V I _D = 15 A V _{GS} = 10 V I _D = 15 A T _c = 100 °C		0.15	0.175 0.35	Ω Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} x R _{DS(on)max} V _{GS} = 10 V	30			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} x R _{DS(on)max} I _D = 15 A	25			S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		6150 780 220	8000 1000 290	pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 250\text{ V}$		40	55	ns
t_r	Rise Time	$R_G = 4.7\ \Omega$ $I_D = 15\text{ A}$ $V_{GS} = 10\text{ V}$		70	90	ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 400\text{ V}$ $I_D = 30\text{ A}$ $R_G = 47\ \Omega$ $V_{GS} = 10\text{ V}$		240		A/ μ s
Q_g	Total Gate Charge	$V_{DD} = 400\text{ V}$ $I_D = 30\text{ A}$ $V_{GS} = 10\text{ V}$		245	320	nC
Q_{gs}	Gate-Source Charge			27		nC
Q_{gd}	Gate-Drain Charge			120		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 400\text{ V}$ $I_D = 30\text{ A}$		75	100	ns
t_f	Fall Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		30	40	ns
t_c	Cross-over Time			110	145	ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				30	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				120	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 30\text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 30\text{ A}$ $V_{DD} = 100\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$ $T_j = 150\text{ }^\circ\text{C}$		800		ns
Q_{rr}	Reverse Recovery Charge			17.6		μ C
I_{RRM}	Reverse Recovery Current			44		A

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

(\bullet) Pulse width limited by safe operating area

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1995 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A

...