



STW16NA40 STH16NA40FI

N - CHANNEL 400V - 0.21Ω - 16A - TO-247/ISOWATT218 POWER MOS TRANSISTORS

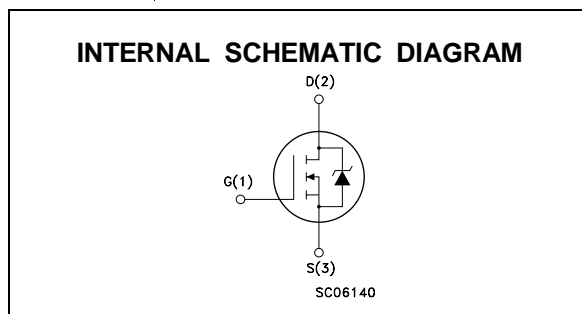
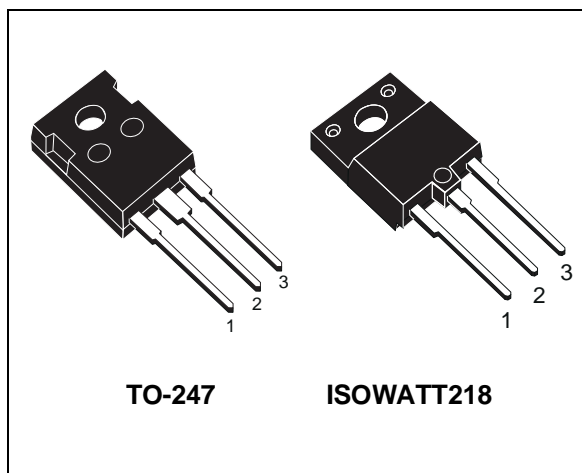
PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STW16NA40	400 V	< 0.3 Ω	16 A
STH16NA40FI	400V	< 0.3 Ω	10 A

- TYPICAL R_{DS(on)} = 0.21 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- APPLICATION ORIENTED CHARACTERIZATION

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLY (SMPS)
- CHOPPER REGULATORS, CONVERTERS, MOTOR CONTROL, LIGHTING FOR INDUSTRIAL AND CONSUMER ENVIRONMENT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STW16NA40	STH16NA40FI	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	400		V
V _{DGR}	Drain- gate Voltage (R _{GS} = 20 kΩ)	400		V
V _{GS}	Gate-source Voltage	± 30		V
I _D	Drain Current (continuous) at T _c = 25 °C	16	10	A
I _D	Drain Current (continuous) at T _c = 100 °C	10	7	A
I _{DM} (●)	Drain Current (pulsed)	64	64	A
P _{tot}	Total Dissipation at T _c = 25 °C	180	70	W
	Derating Factor	1.44	0.56	W/°C
V _{ISO}	Insulation Withstand Voltage (DC)	—	4000	V
T _{stg}	Storage Temperature	-65 to 150		°C
T _j	Max. Operating Junction Temperature	150		°C

(●) Pulse width limited by safe operating area

THERMAL DATA

		TO-247	ISOWATT218	
$R_{thj-case}$	Thermal Resistance Junction-case Max	0.69	1.78	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	30		°C/W
$R_{thc-sink}$	Thermal Resistance Case-sink Typ	0.1		°C/W
T_l	Maximum Lead Temperature For Soldering Purpose	300		°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, $\delta < 1\%$)	16	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$)	435	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, $\delta < 1\%$)	23	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive ($T_c = 100^\circ\text{C}$, pulse width limited by T_j max, $\delta < 1\%$)	10	A

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^\circ\text{C}$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$ $V_{GS} = 0$	400			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$ $T_c = 100^\circ\text{C}$			25 250	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 30\text{ V}$			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\text{ }\mu\text{A}$	2.25	3	3.75	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$ $I_D = 8\text{ A}$ $V_{GS} = 10\text{ V}$ $I_D = 8\text{ A}$ $T_c = 100^\circ\text{C}$		0.21	0.3 0.6	Ω Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10\text{ V}$	16			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (*)$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 8\text{ A}$	9	12		S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ $V_{GS} = 0$		2600	3500	pF
C_{oss}	Output Capacitance			390	540	pF
C_{rss}	Reverse Transfer Capacitance			120	160	pF

ELECTRICAL CHARACTERISTICS (continued)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 200\text{ V}$ $I_D = 8\text{ A}$		20	25	ns
t_r	Rise Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		18	24	ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 320\text{ V}$ $I_D = 16\text{ A}$ $R_G = 47\ \Omega$ $V_{GS} = 10\text{ V}$		380		A/ μ s
Q_g	Total Gate Charge	$V_{DD} = 320\text{ V}$ $I_D = 16\text{ A}$ $V_{GS} = 10\text{ V}$		145		nC
Q_{gs}	Gate-Source Charge			15		nC
Q_{gd}	Gate-Drain Charge			50		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 320\text{ V}$ $I_D = 16\text{ A}$		25	35	ns
t_f	Fall Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		20	25	ns
t_c	Cross-over Time			45	60	ns

SOURCE DRAIN DIODE

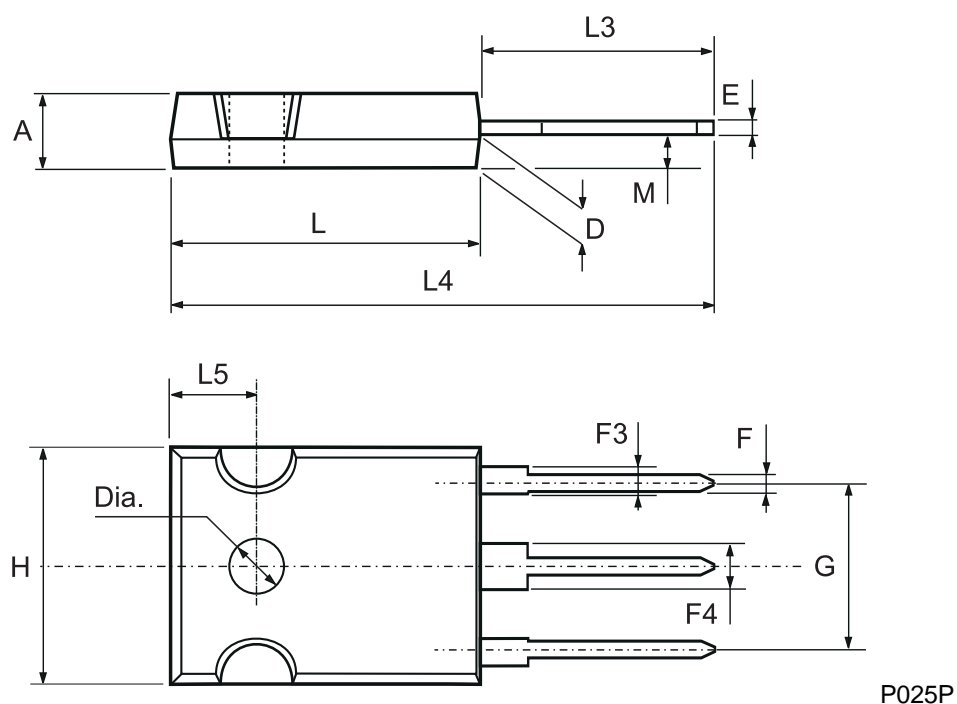
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				16	A
$I_{SDM(\bullet)}$	Source-drain Current (pulsed)				64	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 16\text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 16\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$		550		ns
Q_{rr}	Reverse Recovery Charge			9.6		μC
I_{RRM}	Reverse Recovery Current			35		A

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

(\bullet) Pulse width limited by safe operating area

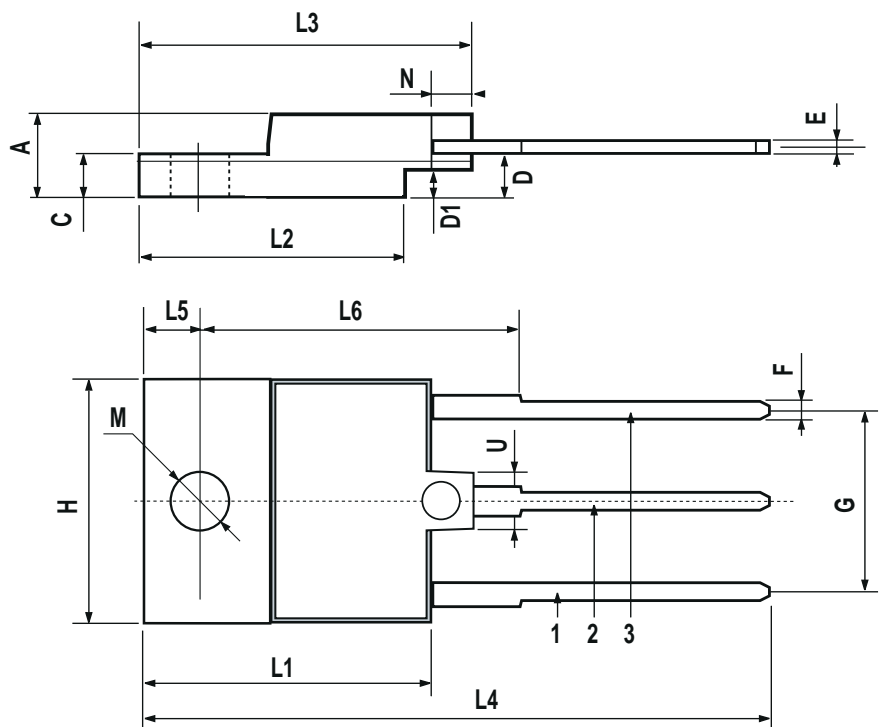
TO-247 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
E	0.4		0.8	0.016		0.031
F	1		1.4	0.039		0.055
F3	2		2.4	0.079		0.094
F4	3		3.4	0.118		0.134
G		10.9			0.429	
H	15.3		15.9	0.602		0.626
L	19.7		20.3	0.776		0.779
L3	14.2		14.8	0.559	0.413	0.582
L4		34.6			1.362	
L5		5.5			0.217	
M	2		3	0.079		0.118
Dia	3.55		3.65	0.140		0.144



ISOWATT218 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	5.35		5.65	0.210		0.222
C	3.3		3.8	0.130		0.149
D	2.9		3.1	0.114		0.122
D1	1.88		2.08	0.074		0.081
E	0.75		1	0.029		0.039
F	1.05		1.25	0.041		0.049
G	10.8		11.2	0.425		0.441
H	15.8		16.2	0.622		0.637
L1	20.8		21.2	0.818		0.834
L2	19.1		19.9	0.752		0.783
L3	22.8		23.6	0.897		0.929
L4	40.5		42.5	1.594		1.673
L5	4.85		5.25	0.190		0.206
L6	20.25		20.75	0.797		0.817
M	3.5		3.7	0.137		0.145
N	2.1		2.3	0.082		0.090
U		4.6			0.181	



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