



## STS2DNE60

### N - CHANNEL 60V - 0.180Ω - 2A SO-8 STripFET™ POWER MOSFET

#### PRELIMINARY DATA

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS2DNE60	60 V	< 0.23 Ω	2 A

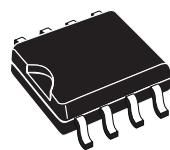
- TYPICAL R<sub>DS(on)</sub> = 0.18 Ω
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- LOW THRESHOLD DRIVE

#### DESCRIPTION

This Power MOSFET is the latest development of STMicroelectronics unique " Single Feature Size™ " strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

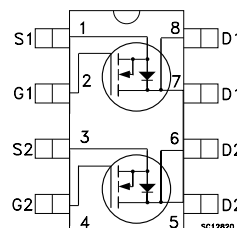
#### APPLICATIONS

- DC MOTOR DRIVE
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- POWER MANAGEMENT IN PORTABLE/DESKTOP PC<sub>s</sub>



SO-8

#### INTERNAL SCHEMATIC DIAGRAM



#### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	60	V
V <sub>DGR</sub>	Drain- gate Voltage (R <sub>GS</sub> = 20 kΩ)	60	V
V <sub>GS</sub>	Gate-source Voltage	± 20	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 25 °C Single Operation	2	A
	Drain Current (continuous) at T <sub>c</sub> = 100 °C Single Operation	1.3	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	8	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C Dual Operation	2	W
	Total Dissipation at T <sub>c</sub> = 25 °C Single Operation	1.6	W

## STS2DNE60

### THERMAL DATA

$R_{thj-amb}$	*Thermal Resistance Junction-ambient	Single Operation	78	$^{\circ}\text{C}/\text{W}$
$T_j$	Maximum Operating Junction Temperature	Dual Operation	62.5	$^{\circ}\text{C}/\text{W}$
$T_{stg}$	Storage Temperature		150	$^{\circ}\text{C}$
			-55 to 150	$^{\circ}\text{C}$

(\*) Mounted on FR-4 board ( $t \leq 10\text{sec}$ )

### 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	$I_D = 250\ \mu\text{A}$ $V_{GS} = 0$	60			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ $T_c = 125^{\circ}\text{C}$			1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20\ \text{V}$			$\pm 100$	nA

ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\ \mu\text{A}$	2	3.3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\ \text{V}$ $I_D = 1\ \text{A}$		0.180	0.23	$\Omega$
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10\ \text{V}$	2			A

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}$ (*)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 1\ \text{A}$		1.8		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25\ \text{V}$ $f = 1\ \text{MHz}$ $V_{GS} = 0\ \text{V}$		310		pF
$C_{oss}$	Output Capacitance			45		pF
$C_{rss}$	Reverse Transfer Capacitance			12		pF

**ELECTRICAL CHARACTERISTICS** (continued)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 30\text{ V}$ $I_D = 1\text{ A}$		9		ns
$t_r$	Rise Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, see fig. 3)		10		ns
$Q_g$	Total Gate Charge	$V_{DD} = 24\text{ V}$ $I_D = 2\text{ A}$ $V_{GS} = 4.5\text{ V}$		12	16	nC
$Q_{gs}$	Gate-Source Charge			5.1		nC
$Q_{gd}$	Gate-Drain Charge			2.7		nC

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off Delay Time	$V_{DD} = 30\text{ V}$ $I_D = 1\text{ A}$		25		ns
$t_f$	Fall Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, see fig. 3)		5		ns
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{clamp} = 48\text{ V}$ $I_D = 2\text{ A}$		4.5		ns
$t_f$	Fall Time	$R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$		5		ns
$t_c$	Cross-over Time	(Inductive Load, see fig. 5)		12		ns

**SOURCE DRAIN DIODE**

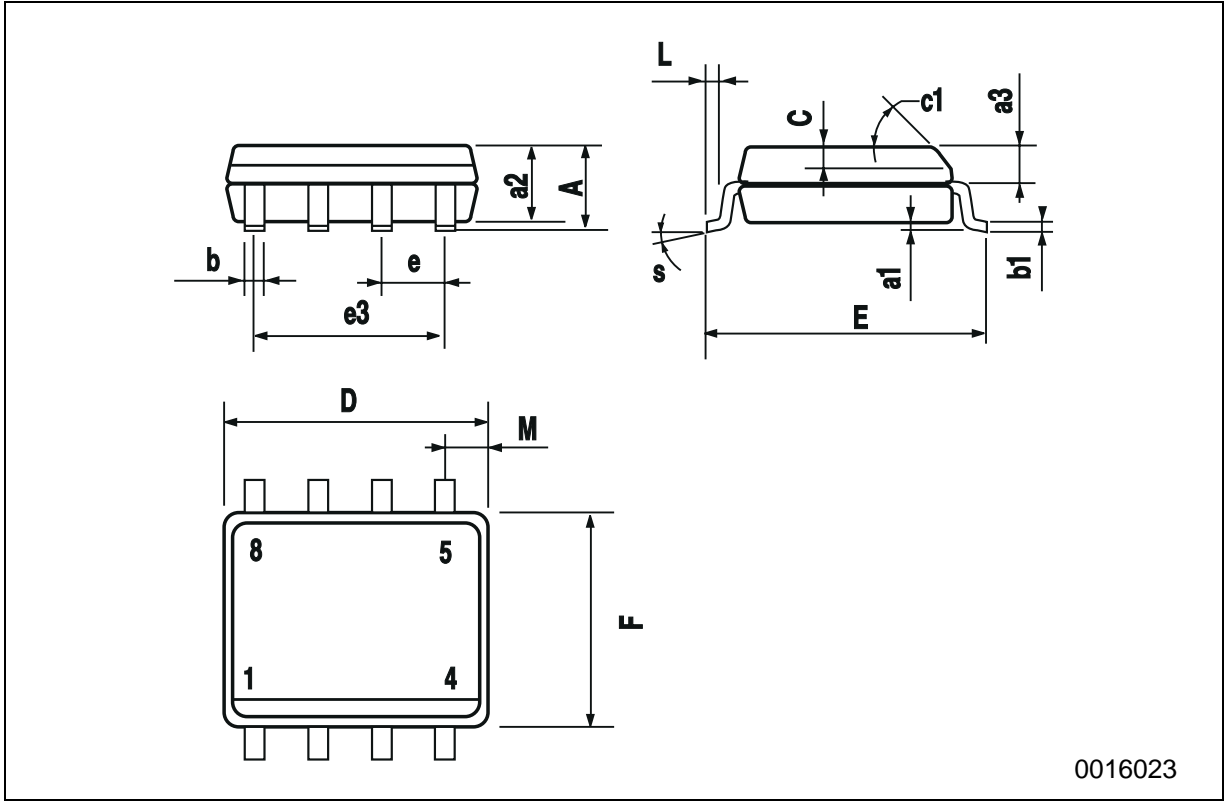
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				2	A
$I_{SDM(\bullet)}$	Source-drain Current (pulsed)				8	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 2\text{ A}$ $V_{GS} = 0$			1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 2\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 25\text{ V}$ $T_J = 150\text{ }^\circ\text{C}$ (see test circuit, fig. 5)		40		ns
$Q_{rr}$	Reverse Recovery Charge			50		nC
$I_{RRM}$	Reverse Recovery Current			2.5		A

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

SO-8 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					



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