



# STD20NF06

## N-CHANNEL 60V - 0.032 $\Omega$ - 24A DPAK STripFET™ II POWER MOSFET

PRELIMINARY DATA

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STD20NF06	60 V	< 0.040 $\Omega$	24 A

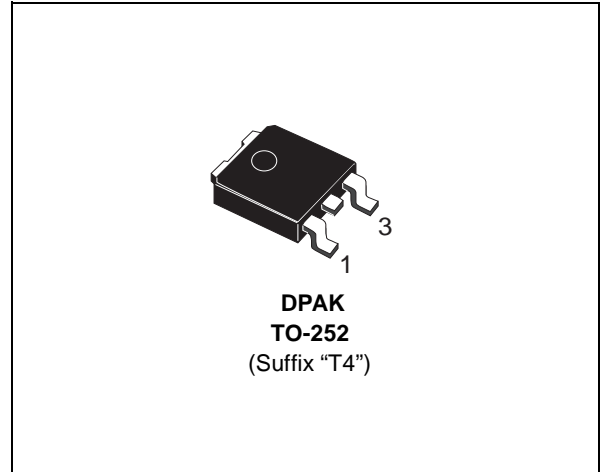
- TYPICAL R<sub>DS(on)</sub> = 0.032  $\Omega$
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION
- SURFACE-MOUNTING DPAK (TO-252)  
POWER PACKAGE IN TAPE & REEL  
(SUFFIX "T4")

### DESCRIPTION

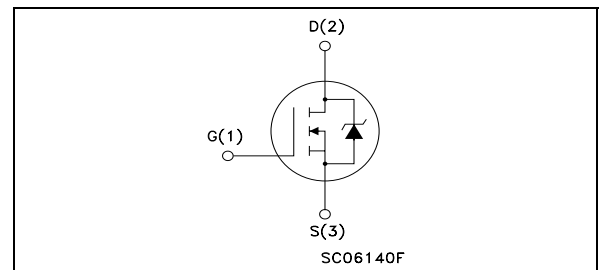
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

### APPLICATIONS

- AUDIO AMPLIFIERS
- POWER TOOLS
- AUTOMOTIVE ENVIRONMENT



### INTERNAL SCHEMATIC DIAGRAM



### Ordering Information

SALES TYPE	MARKING	PACKAGE	PACKAGING
STD20NF06	STD20NF06	TO-252	TAPE & REEL

### 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 k $\Omega$ )	60	V
V <sub>GS</sub>	Gate- source Voltage	$\pm 20$	V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	24	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	17	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	96	A
P <sub>tot</sub>	Total Dissipation at T <sub>C</sub> = 25°C	60	W
	Derating Factor	0.4	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	10	V/ns
E <sub>AS</sub> (2)	Single Pulse Avalanche Energy	300	mJ
T <sub>stg</sub>	Storage Temperature	-55 to 175	°C
T <sub>j</sub>	Operating Junction Temperature		

(•) Pulse width limited by safe operating area.

(1) I<sub>SD</sub>  $\leq$  24A, di/dt  $\leq$  100A/ $\mu$ s, V<sub>DD</sub>  $\leq$  V(BR)DSS, T<sub>j</sub>  $\leq$  T<sub>JMAX</sub>

(2) Starting T<sub>j</sub> = 25 °C, I<sub>D</sub> = 10 A, V<sub>DD</sub> = 45V

## STD20NF06

### THERMAL DATA

Rthj-case	Thermal Resistance Junction-case	Max	2.5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max	100	°C/W
T <sub>I</sub>	Maximum Lead Temperature For Soldering Purpose (1.6 mm from case, for 10 sec)	Max	275	°C

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 µA, V <sub>GS</sub> = 0	60			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max Rating V <sub>DS</sub> = Max Rating T <sub>C</sub> = 125°C			1 10	µA µA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 20V			±100	nA

ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = 250 µA	2		4	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V I <sub>D</sub> = 12 A		0.032	0.040	Ω

### DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> (*)	Forward Transconductance	V <sub>DS</sub> = 25 V I <sub>D</sub> = 12 A		15		S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 25V f = 1 MHz V <sub>GS</sub> = 0		690		pF
C <sub>oss</sub>	Output Capacitance			170		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			68		pF

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on Delay Time Rise Time	$V_{DD} = 30\text{ V}$ $I_D = 10\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		10 30		ns ns
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 48\text{ V}$ $I_D = 20\text{ A}$ $V_{GS} = 10\text{ V}$		23 5 7.5	31	nC nC nC

**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ $t_f$	Turn-off Delay Time Fall Time	$V_{DD} = 30\text{ V}$ $I_D = 10\text{ A}$ $R_G = 4.7\ \Omega$ , $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		30 8		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)				24 96	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 96\text{ A}$ $V_{GS} = 0$			1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 96\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 20\text{ V}$ $T_J = 150^\circ\text{C}$ (see test circuit, Figure 5)		65 150 4.6		ns nC A

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

(\bullet) Pulse width limited by safe operating area.

Fig. 1: Unclamped Inductive Load Test Circuit

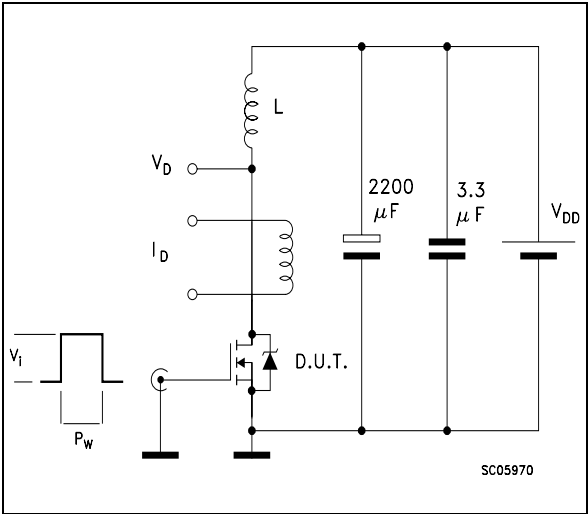


Fig. 2: Unclamped Inductive Waveform

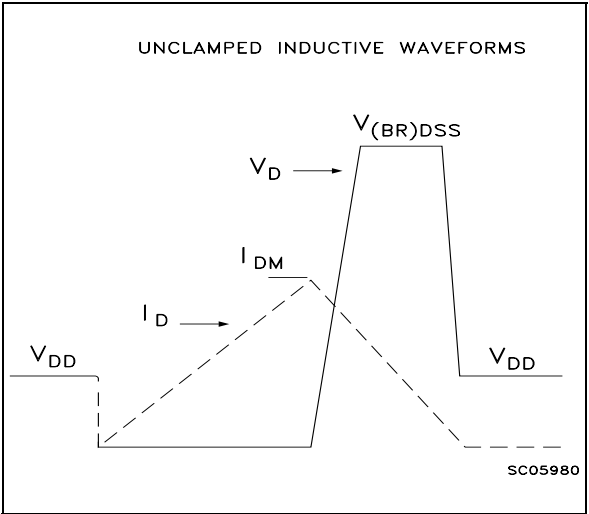


Fig. 3: Switching Times Test Circuits For Resistive Load

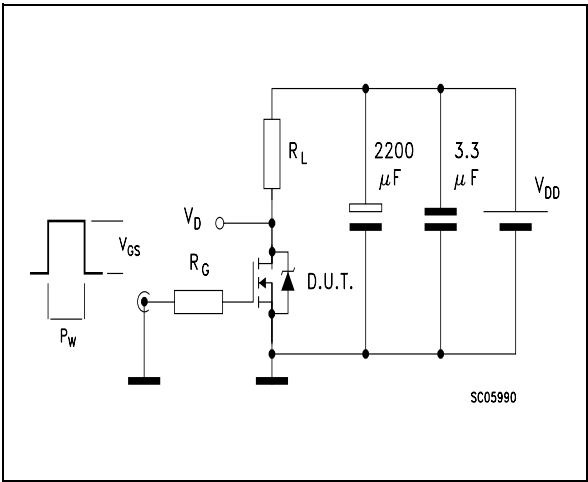


Fig. 4: Gate Charge test Circuit

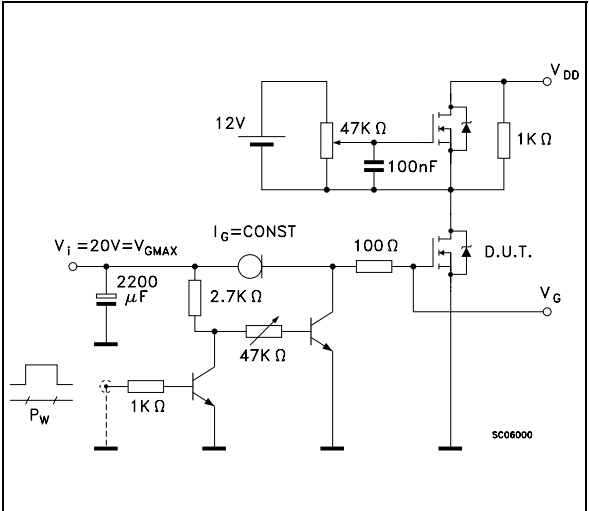
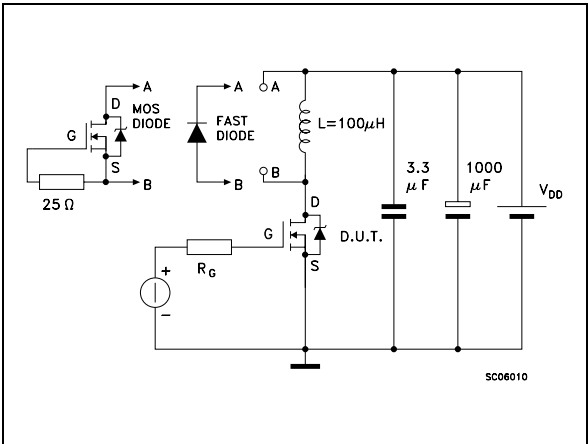
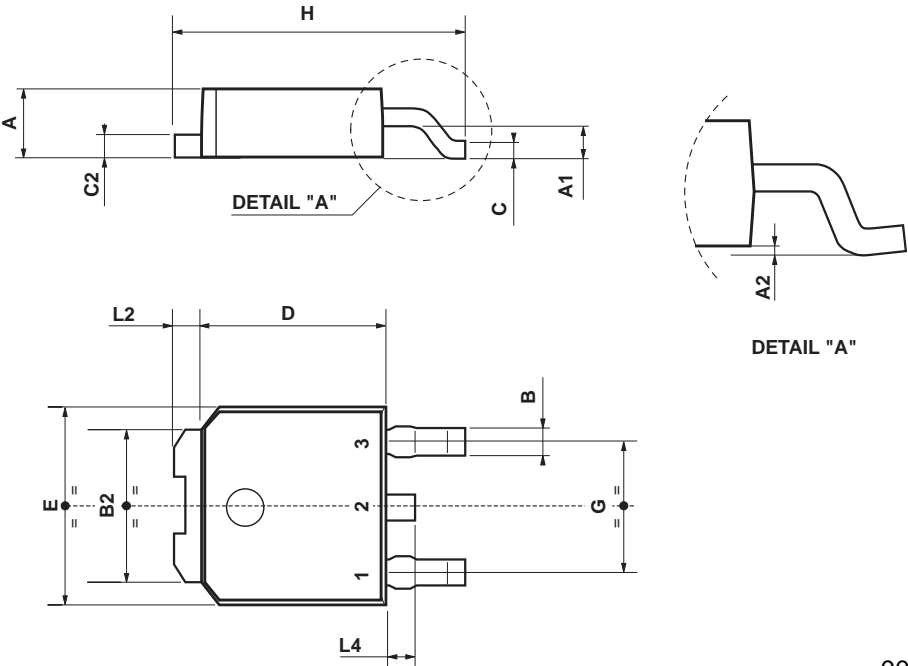


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



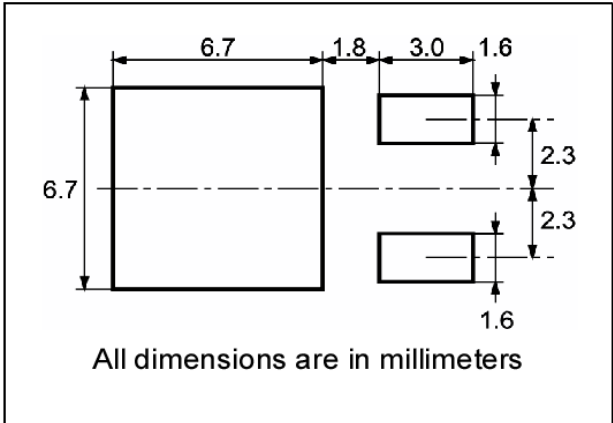
TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L2		0.8			0.031	
L4	0.6		1	0.023		0.039

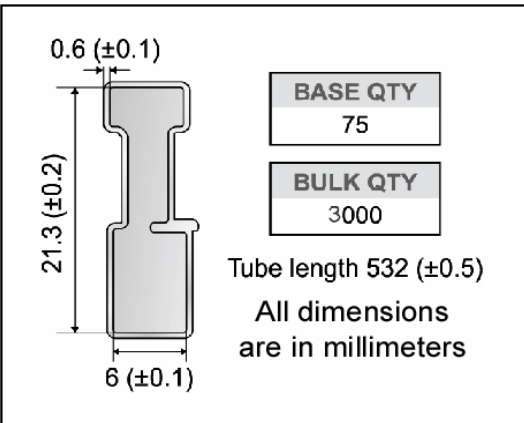


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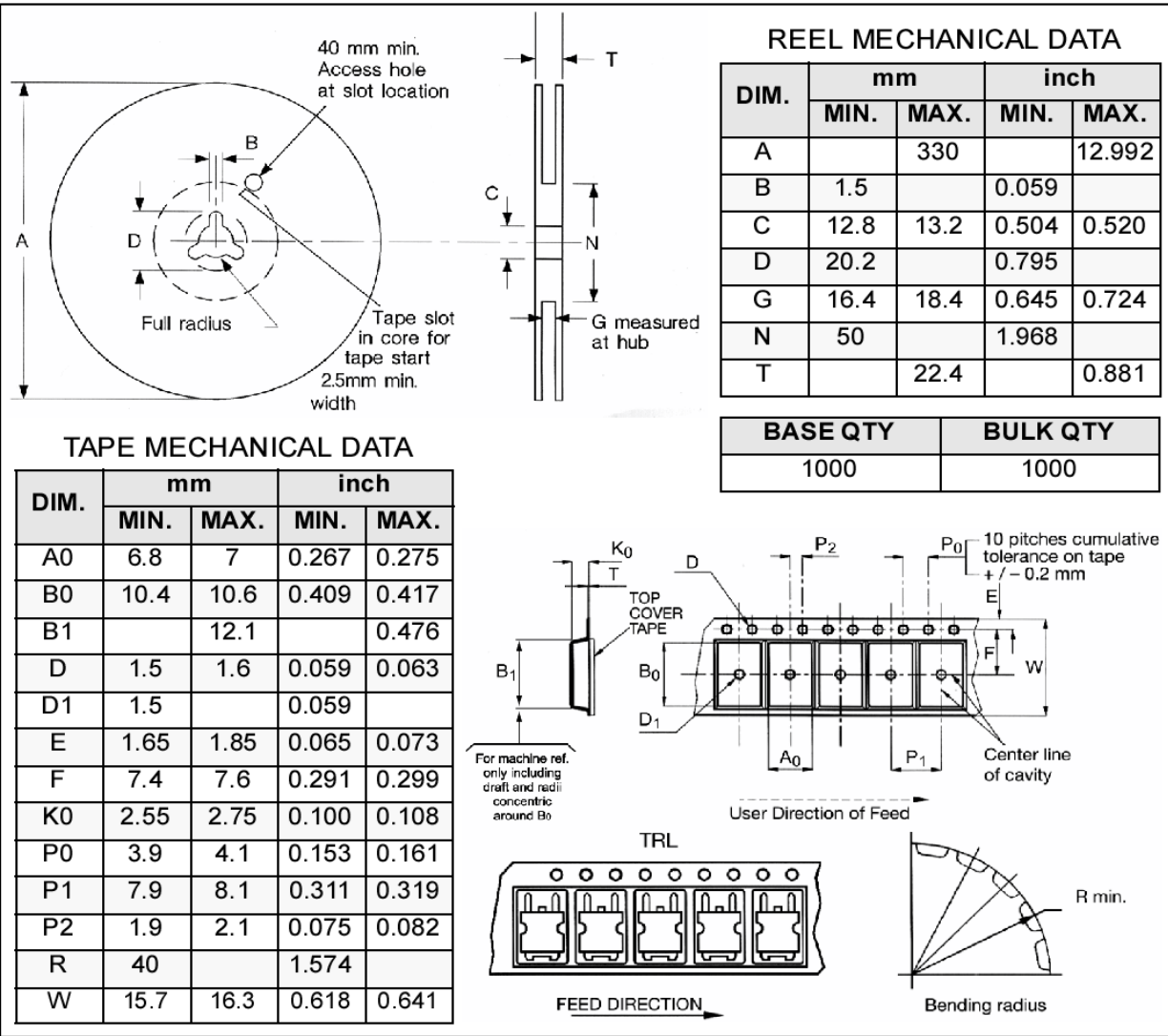
### DPAK FOOTPRINT



### TUBE SHIPMENT (no suffix)\*



### TAPE AND REEL SHIPMENT (suffix "T4")\*



\*on sales type

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