STD5N20L

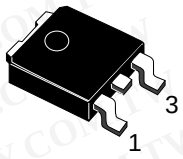
N-CHANNEL 200V - 0.65Ω - 5A DPAK
STripFET™ MOSFET

Table 1: General Features

TYPE	V_{DSS}	$R_{DS(on)}$	I_D	Pw
STD5N20L	200 V	< 0.7 Ω	5 A	33 W

- TYPICAL $R_{DS}(on)$ = 0.65 Ω @ 5V
- CONDUCTION LOSSES REDUCED
- LOW INPUT CAPACIATNCE
- LOW THRESHOLD DEVICE

Figure 1: Package

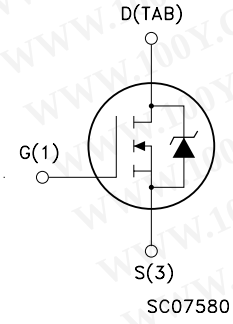


DPAK

DESCRIPTION

The STD5N20L utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This is suitable for the most demanding DC Motor Control and lighting application.

Figure 2: Internal Schematic Diagram



APPLICATIONS

- UPS AND MOTOR CONTROL
- LIGHTING

Table 2: Order Codes

SALES TYPE	MARKING	PACKAGE	PACKAGING
STD5N20LT4	D5N20L	DPAK	TAPE & REEL

Rev. 3

NEW DATASHEET ACCORDING TO PCN DSG-TRA/04/532

Table 3: Absolute Maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	200	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	200	V
V_{GS}	Gate- source Voltage	±20	V
I_D	Drain Current (continuous) at T_C = 25°C	5	A
I_D	Drain Current (continuous) at T_C = 100°C	3.6	A
I_{DM} (•)	Drain Current (pulsed)	20	A
P_{TOT}	Total Dissipation at T_C = 25°C	33	W
	Derating Factor	0.27	W/°C
T_{stg}	Storage Temperature	–55 to 150	°C
T_j	Operating Junction Temperature		

(•) Pulse width limited by safe operating area

Table 4: Thermal Data

Rthj-case	Thermal Resistance Junction-case Max	3.75	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose	275	°C

ELECTRICAL CHARACTERISTICS (T_{CASE} =25°C UNLESS OTHERWISE SPECIFIED)

Table 5: On/Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 µA, V_{GS} = 0	200			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating			1	µA
		V_{DS}= Max Rating, T_C= 125°C			10	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 50µA	1		2.5	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 5 V, I_D = 2.5 A		0.65	0.7	Ω

Table 6: Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (2)	Forward Transconductance	V_{DS} = 15 V, I_{D} = 5 A		6.5		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		242 44 6		pF pF pF
$t_{d(on)}$ t_{r} $t_{d(off)}$ t_{f}	Turn-on Delay Time Rise Time Turn-off Delay Time Fall Time	V_{DD} = 100 V, I_{D} = 2.5 A R_{G} = 4.7Ω, V_{GS} = 5V (Resistive Load see Figure 14)		11.5 21.5 14 15.5		ns ns ns ns
Q_{g} Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 160 V, I_{D} = 5 A, V_{GS} = 5V		5 1.5 3	6	nC nC nC

Table 7: Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				5	A
I_{SDM} (*)	Source-drain Current (pulsed)				20	A
V_{SD} (1)	Forward On Voltage	I_{SD} = 5 A, V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 5 A, di/dt = 100 A/µs, V_{DD} = 100 V, T_{j} = 25°C (see test circuit, see Figure 15)		93 237 5.1		ns nC A
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 5 A, di/dt = 100 A/µs, V_{DD} = 100 V, T_{j} = 150°C (see test circuit, see Figure 15)		97 286 5.9		ns nC A

(1) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(2) Starting T_{j} =25 °C, I_{d} = 5 A, V_{DD} = 50 V
(*) Pulse width limited by safe operating area

Figure 3: Safe Operating Area

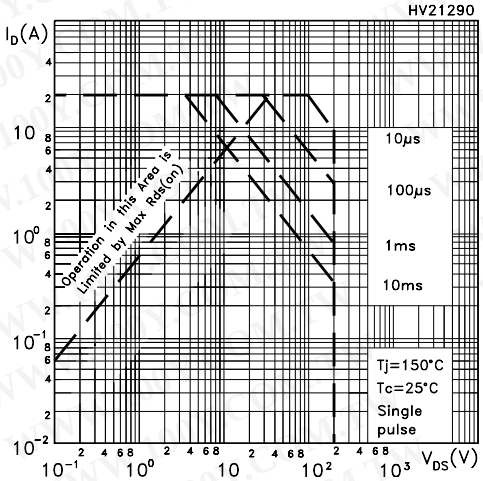


Figure 4: Output Characteristics

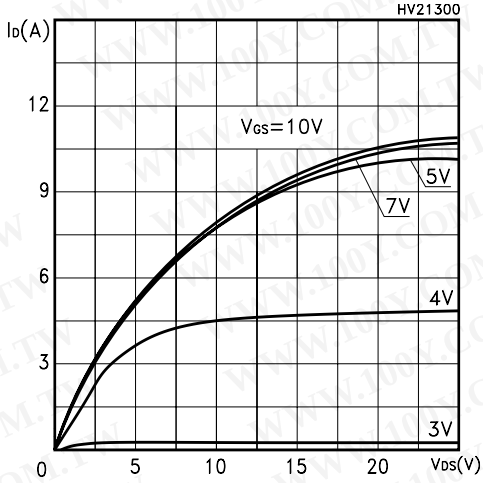


Figure 5: Transconductance

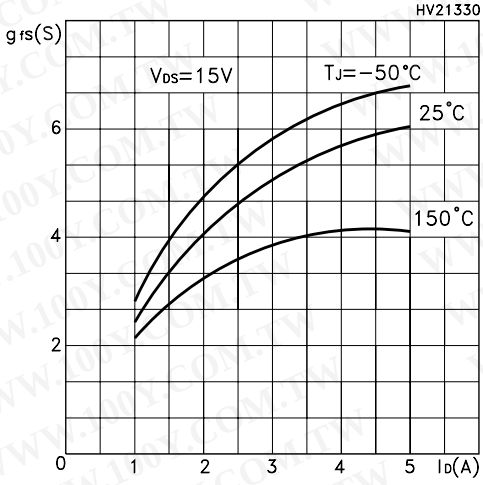


Figure 6: Thermal Impedance

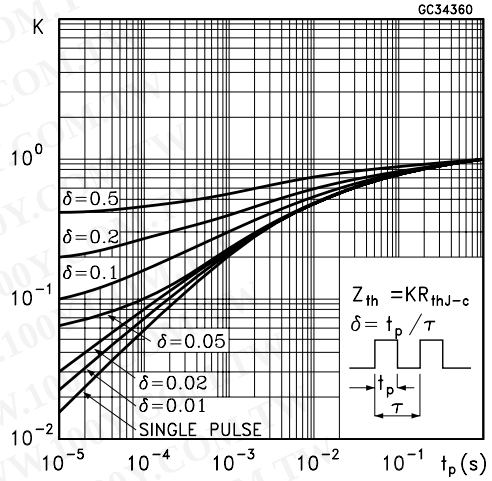


Figure 7: Transfer Characteristics

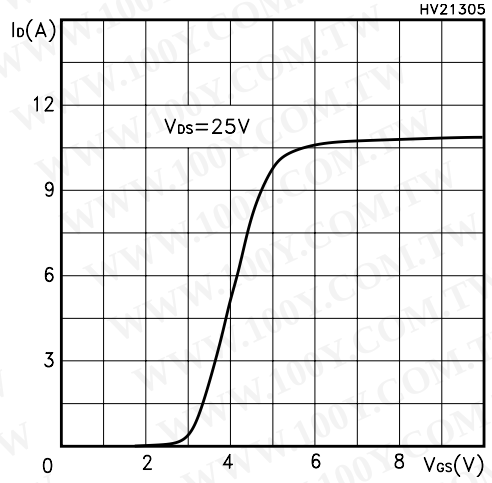


Figure 8: Static Drain-source On Resistance

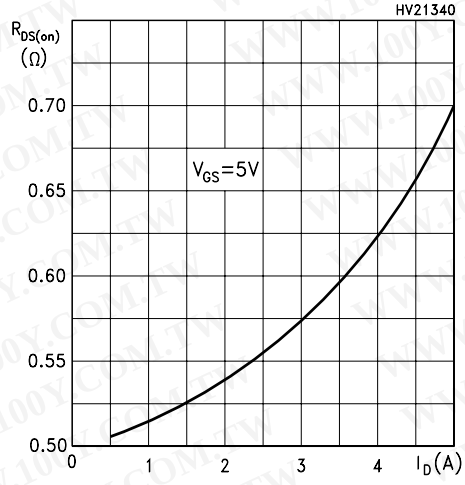


Figure 9: Gate Charge vs Gate-source Voltage

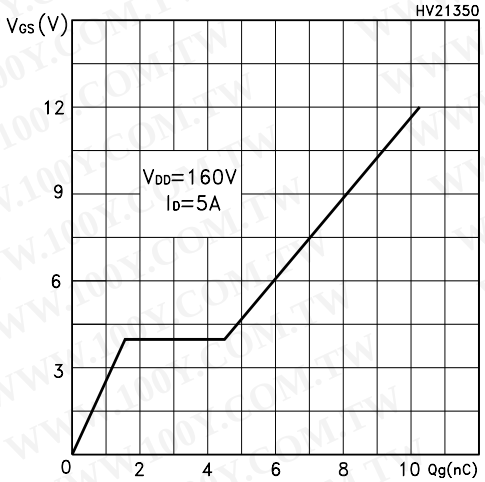


Figure 10: Normalized Gate Thereshold Voltage vs Temperature

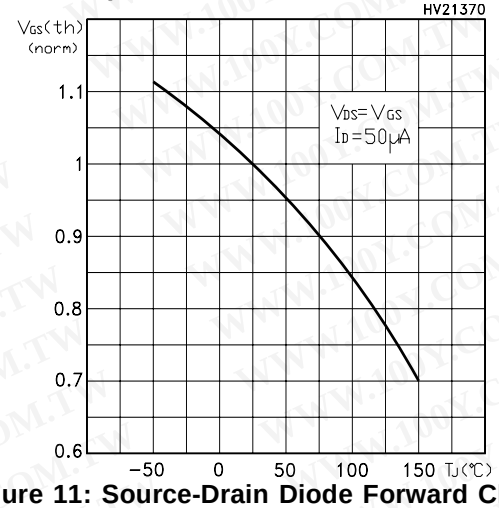


Figure 11: Source-Drain Diode Forward Characteristics

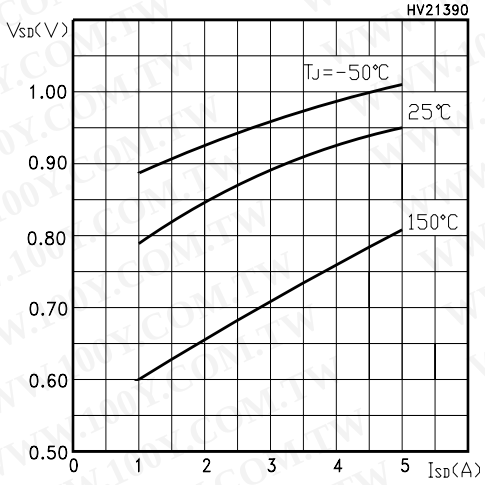


Figure 12: Capacitance Variations

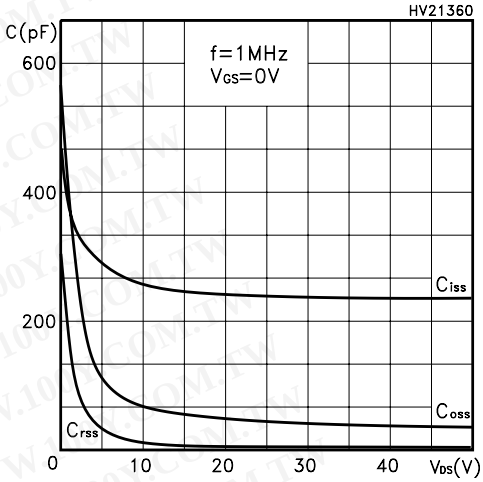


Figure 13: Normalized On Resistance vs Temperature

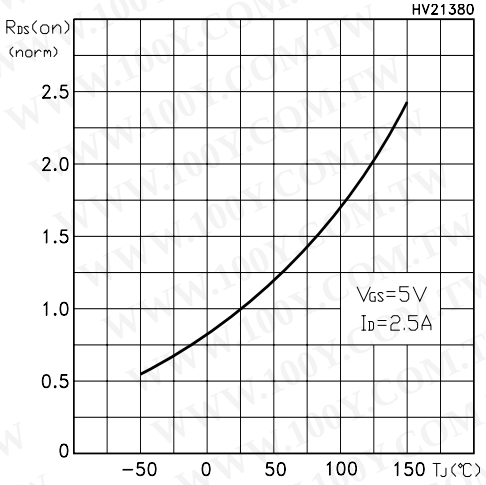


Figure 14: Switching Times Test Circuit For Resistive Load

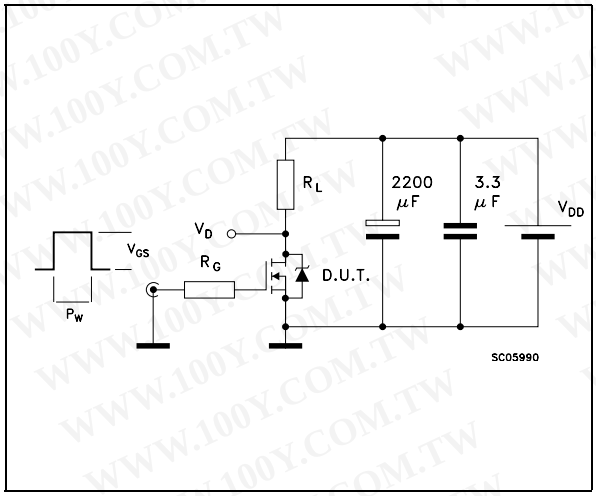


Figure 15: Test Circuit For Inductive Load Switching and Diode Recovery Times

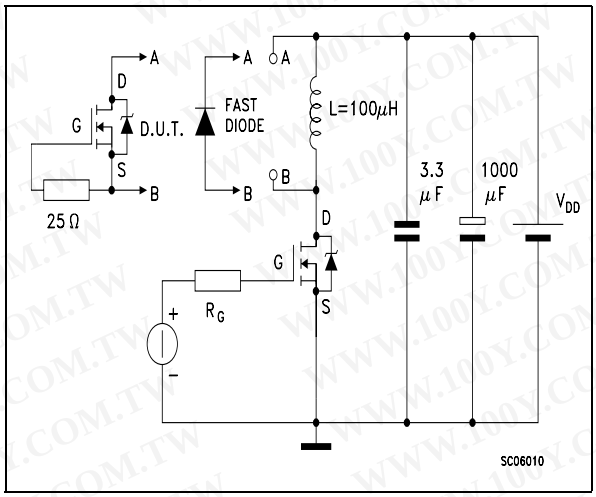
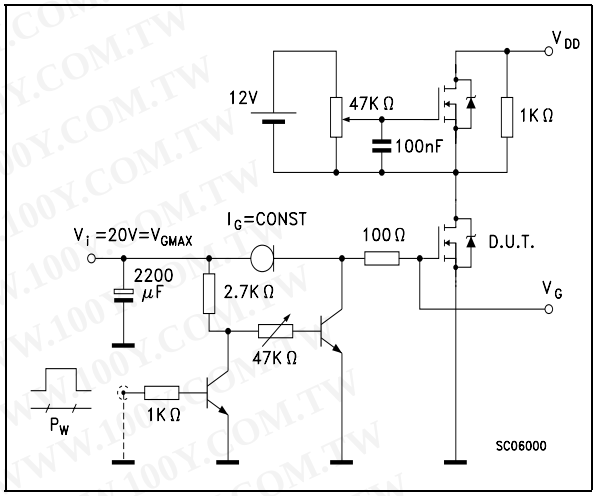
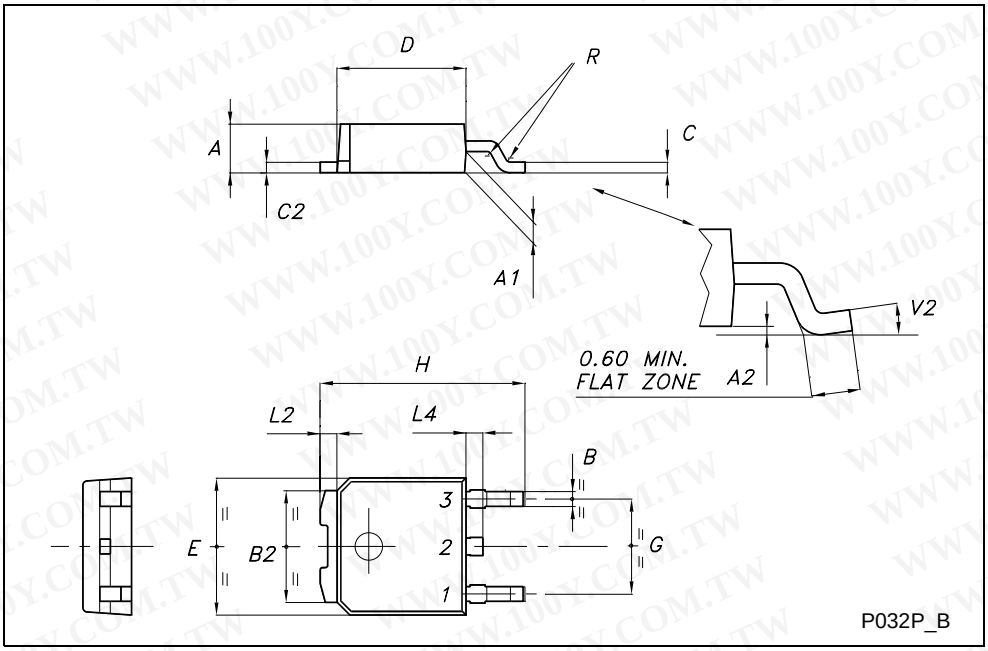


Figure 16: Gate Charge Test Circuit

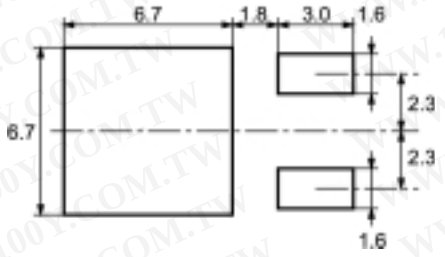


TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0^o		8^o	0^o		0^o

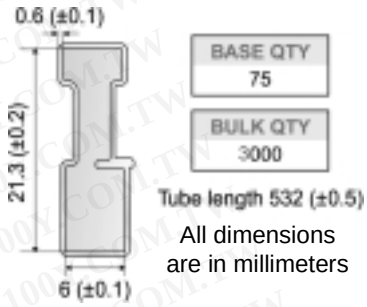


DPAK FOOTPRINT



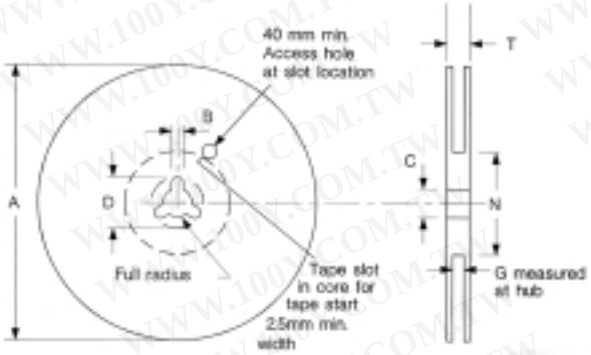
All dimensions are in millimeters

TUBE SHIPMENT (no suffix)*



All dimensions are in millimeters

TAPE AND REEL SHIPMENT (suffix "T4")*



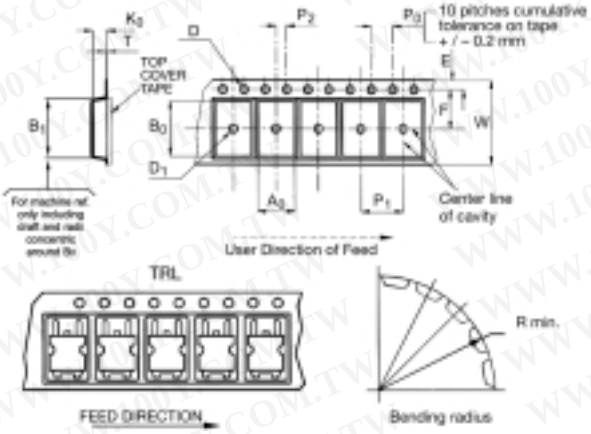
REEL MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY	BULK QTY
2500	2500

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641



* on sales type

Table 8: Revision History

Date	Revision	Description of Changes
08-June-2004	2	New Stylesheet. Datasheet according to PCN DSG-TRA/04/532
20-Sep-2004	3	Changes on Table 3, and on Figure 3.