



STD38NF03L

N-CHANNEL 30V - 0.011Ω - 38A DPAK

STripFET™ MOSFET

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STD38NF03L	30 V	< 0.0145 Ω	38 A

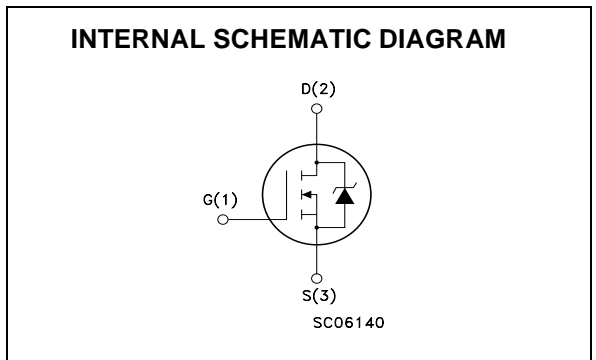
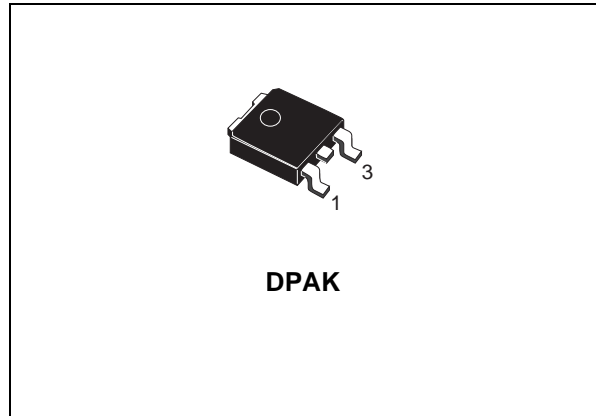
- TYPICAL R_{DS(on)} = 0.011 Ω
- OPTIMIZED FOR HIGH SWITCHING OPERATIONS
- LOW THRESHOLD DRIVE
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL
- GATE CHARGE MINIMIZED

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

- HIGH CURRENT, HIGH SPEED SWITCHING
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	30	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	30	V
V _{GS}	Gate- source Voltage	± 16	V
I _D (*)	Drain Current (continuous) at T _C = 25°C	38	A
I _D	Drain Current (continuous) at T _C = 100°C	27	A
I _{DM} (●)	Drain Current (pulsed)	152	A
P _{TOT}	Total Dissipation at T _C = 25°C	45	W
	Derating Factor	0.3	W/°C
T _{stg}	Storage Temperature	- 55 to 175	°C
T _j	Max. Operating Junction Temperature		

(●) Pulse width limited by safe operating area

(*) Value Limited by Package

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THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	3.33	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°C/W
T _I	Maximum Lead Temperature For Soldering Purpose	275	°C

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED) OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0	30			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 16V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.7	2.5	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10V, I _D = 19 A V _{GS} = 4.5V, I _D = 19 A		0.011 0.014	0.0145 0.0215	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} , I _D = 19 A		28		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1450		pF
C _{oss}	Output Capacitance			390		pF
C _{rss}	Reverse Transfer Capacitance			155		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15\text{ V}$, $I_D = 27.5\text{ A}$ $R_G = 4.7\Omega$, $V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 3)		25		ns
t_r	Rise Time			280		ns
Q_g	Total Gate Charge	$V_{DD} = 24\text{ V}$, $I_D = 55\text{ A}$, $V_{GS} = 4.5\text{ V}$		27	36	nC
Q_{gs}	Gate-Source Charge			11		nC
Q_{gd}	Gate-Drain Charge			12		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 15\text{ V}$, $I_D = 27.5\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 3)		60		ns
t_f	Fall Time			240		ns
$t_{d(off)}$	Off-voltage Rise Time	$V_{clamp} = 24\text{ V}$, $I_D = 55\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 5)		140		ns
t_f	Fall Time			200		ns
t_c	Cross-over Time			350		ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				38	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				152	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 38\text{ A}$, $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 55\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 15\text{ V}$, $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		45		ns
Q_{rr}	Reverse Recovery Charge			52		nC
I_{RRM}	Reverse Recovery Current			2.3		A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

Fig. 1: Unclamped Inductive Load Test Circuit

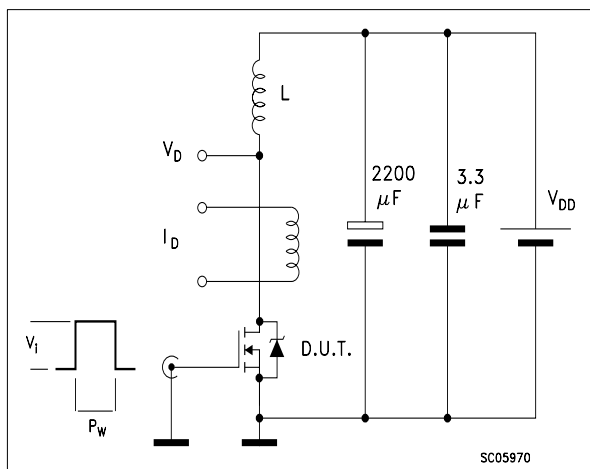


Fig. 2: Unclamped Inductive Waveform

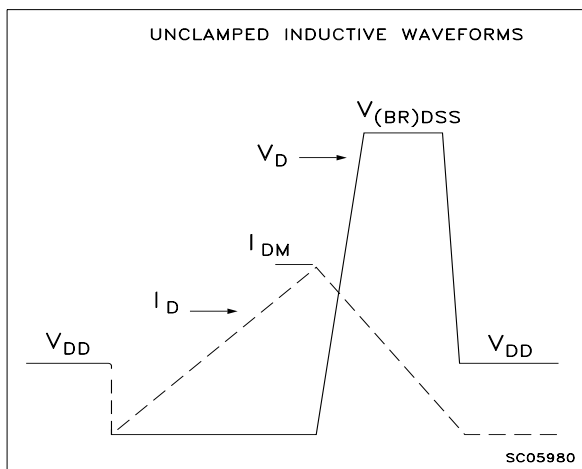


Fig. 3: Switching Times Test Circuit For Resistive Load

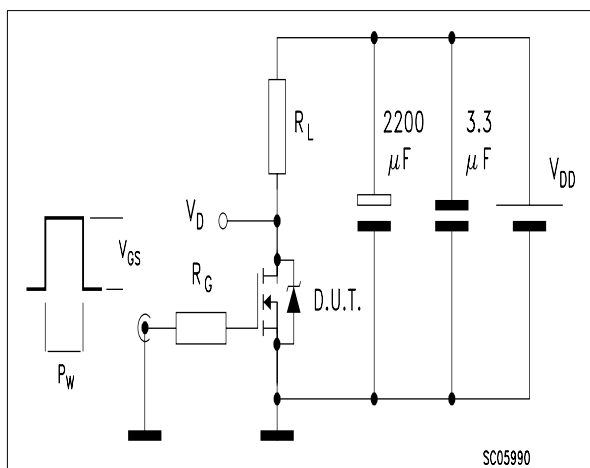


Fig. 4: Gate Charge test Circuit

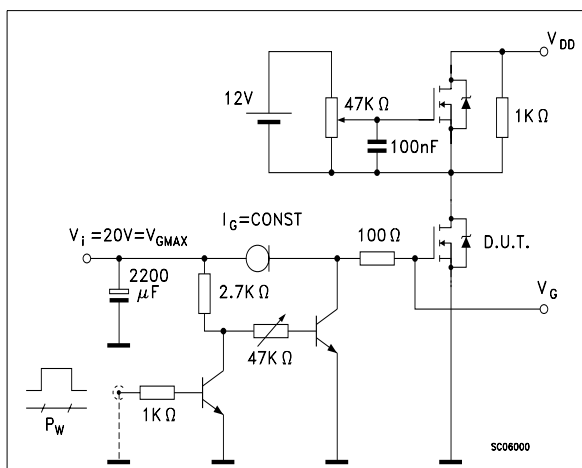
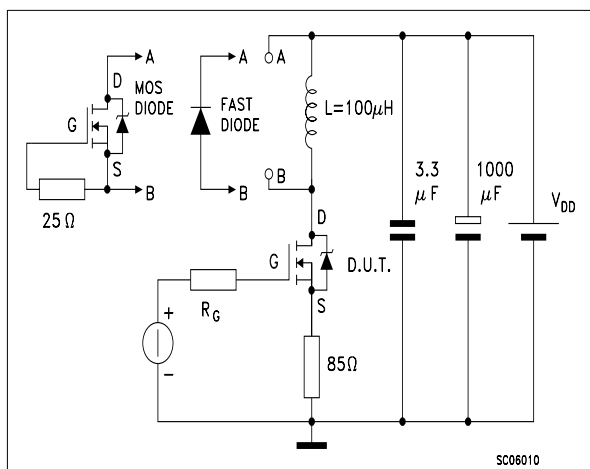
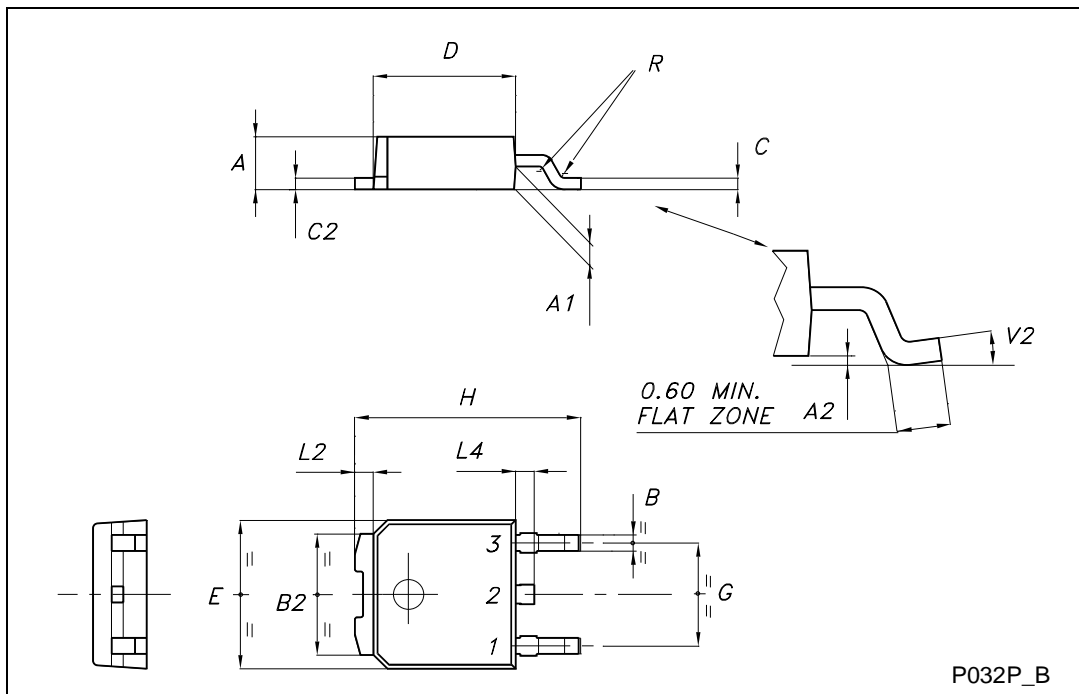


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

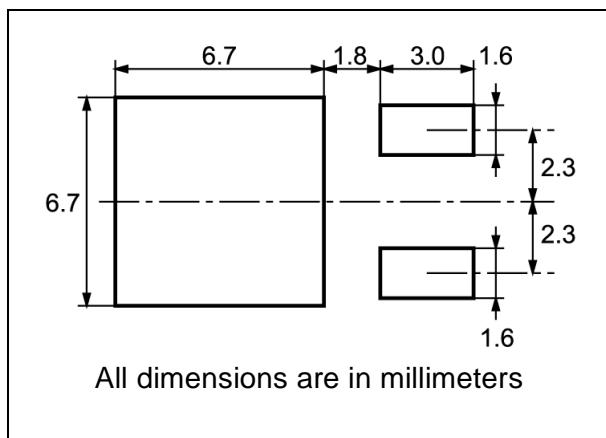


TO-252 (DPAK) MECHANICAL DATA

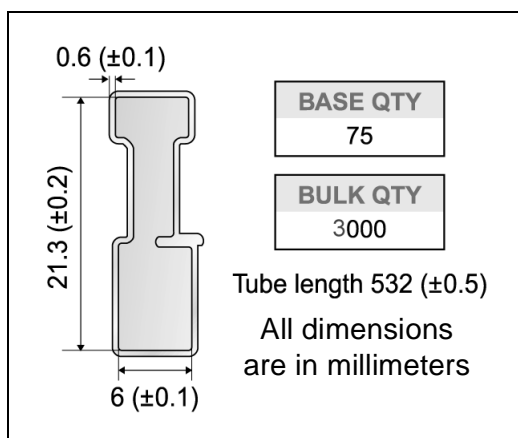
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		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°		8°	0°		0°



DPAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

40 mm min. Access hole at slot location

Full radius

Tape slot in core for tape start 2.5mm min. width

G measured at hub

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

10 pitches cumulative tolerance on tape +/- 0.2 mm

TOP COVER TAPE

For machine ref. only including draft and radii concentric around B0

User Direction of Feed

Center line of cavity

R min.

Bending radius

FEED DIRECTION

* on sales type

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