

STP55NF06 STB55NF06-1 STP55NF06FP

N-CHANNEL 60V - 0.015 Ω - 50A TO-220/TO-220FP/I²PAK STripFET™ II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP55NF06	60 V	<0.018 Ω	50 A
STB55NF06-1	60 V	<0.018 Ω	50 A
STB55NF06FP	60 V	<0.018 Ω	26 A

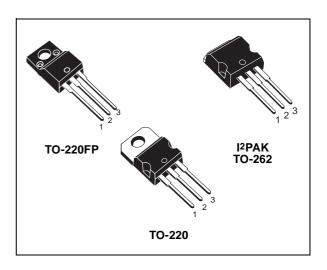
- TYPICAL $R_{DS}(on) = 0.015 \Omega$
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED **CHARACTERIZATION**

DESCRIPTION

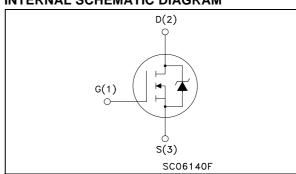
This Power MOSFET is the latest development of STMicroelectronis unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low onresistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

APPLICATIONS

- HIGH CURRENT, HIGH SWITCHING SPEED
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS
- AUTOMOTIVE ANVIRONMENT (INJECTION, ABS, AIR-BAG, LAMPDRIVERS, Etc.)



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Va	lue	Unit
		STP55NF06 STB55NF06	STP55NF06FP	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	6	60	V
V _{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	6	60	V
V _{GS}	Gate- source Voltage	±	20	V
I _D	Drain Current (continuous) at T _C = 25°C	50	26	А
I _D	Drain Current (continuous) at T _C = 100°C	35	18	Α
I _{DM} (●)	Drain Current (pulsed)	200	104	Α
P _{tot}	Total Dissipation at T _C = 25°C	110	30	W
	Derating Factor	0.73	0.2	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope		7	V/ns
E _{AS} (2)	Single Pulse Avalanche Energy	350		mJ
T _{stg}	Storage Temperature	-55 t	°C	
Tj	Operating Junction Temperature	-55 (0 173	

^(•) Pulse width limited by safe operating area.

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⁽¹⁾ $I_{SD} \le 50A$, $di/dt \le 400A/\mu s$, $V_{DD} \le V_{(BR)DSS}$, $T_j \le T_{JMAX}$ (2) Starting $T_j = 25$ °C, $I_D = 25A$, $V_{DD} = 30V$

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THERMAL DATA

			I ² PAK TO-220	TO-220FP	
Rthj-case	Thermal Resistance Junction-case	Max	1.36	5	°C/W
Rthj-amb T _I	Thermal Resistance Junction-ambient Maximum Lead Temperature For Soldering Purpose	Max	62 30	-	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	$I_D = 250 \ \mu A, \ V_{GS} = 0$	60			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	$V_{DS} = Max Rating$ $V_{DS} = Max Rating T_C = 125^{\circ}C$			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 20 V			±100	nA

ON (*)

Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}$	I _D = 250 μA	2	3	4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V	I _D = 27.5 A		0.015	0.018	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
g _{fs} (*)	Forward Transconductance	$V_{DS} = 15 \text{ V}$ $I_{D} = 27.5 \text{ A}$		18		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25V, f = 1 \text{ MHz}, V_{GS} = 0$		1530 300 105		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbo	l Parameter	Test Conditions	Min.	Тур.	Max.	Unit
t _{d(on)}	Turn-on Delay Time Rise Time	$ \begin{array}{c cccc} V_{DD} = 30 \ V & I_D = 27.5 \ A \\ R_G = 4.7 \ \Omega & V_{GS} = 10 \ V \\ (Resistive Load, Figure 3) \end{array} $		16 8		ns ns
Q _g Q _{gs} Q _{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V _{DD} = 48 V I _D = 55 A V _{GS} = 10V		44.5 10.5 17.5	60	nC nC nC

SWITCHING OFF

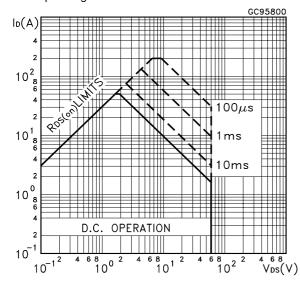
Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
t _{d(Off)} t _f	Turn-off Delay Time Fall Time	$\begin{array}{ccc} V_{DD} = 30 V & I_D = 27.5 \text{ A} \\ R_G = 4.7 \Omega, & V_{GS} = 10 \text{ V} \\ \text{(Resistive Load, Figure 3)} \end{array}$		36 15		ns ns

SOURCE DRAIN DIODE

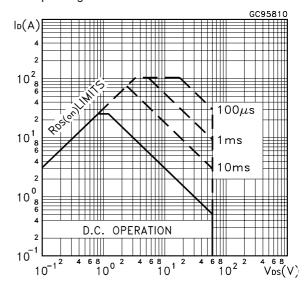
Symbol	Parameter	Parameter Test Conditions		Тур.	Max.	Unit
I _{SD} I _{SDM} (•)	Source-drain Current Source-drain Current (pulsed)				50 220	A A
V _{SD} (*)	Forward On Voltage	I _{SD} = 55A			1.5	V
t _{rr} Q _{rr} I _{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$\begin{split} I_{SD} = 55 \text{ A} & \text{di/dt} = 100 \text{A/µs} \\ V_{DD} = 30 \text{ V} & T_j = 150 ^{\circ}\text{C} \\ \text{(see test circuit, Figure 5)} \end{split}$		75 170 4.5		ns nC A

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

Safe Operating Area for TO-220



Safe Operating Area for TO-220FP

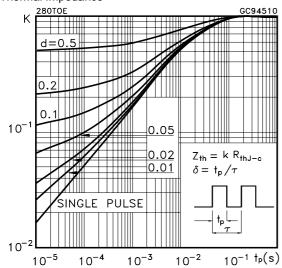


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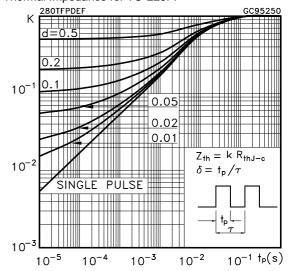
^(•)Pulse width limited by safe operating area.

STB55NF06-1 STP55NF06 STP55NF06FP

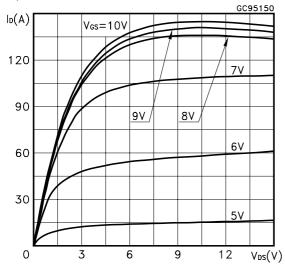
Thermal Impedance



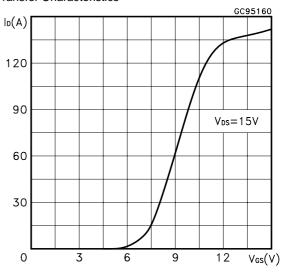
Thermal Impedance for TO-220FP



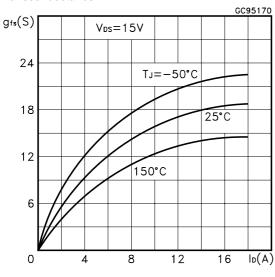
Output Characteristics



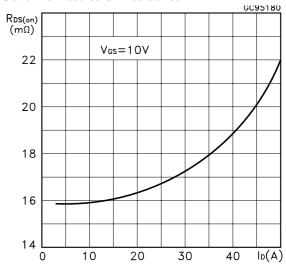
Transfer Characteristics



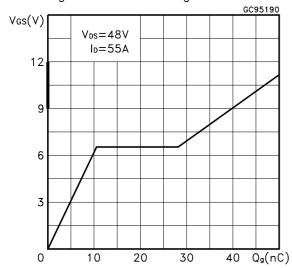
Transconductance



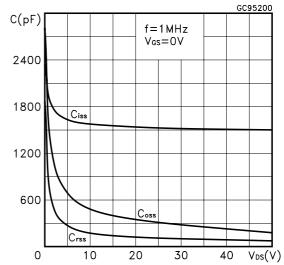
Static Drain-source On Resistance



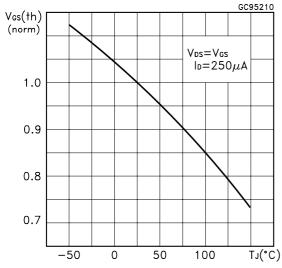
Gate Charge vs Gate-source Voltage



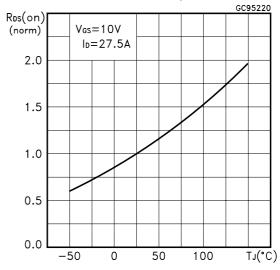
Capacitance Variations



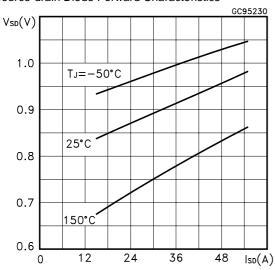
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage Temperature

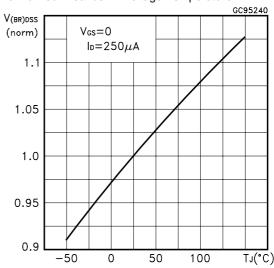


Fig. 1: Unclamped Inductive Load Test Circuit

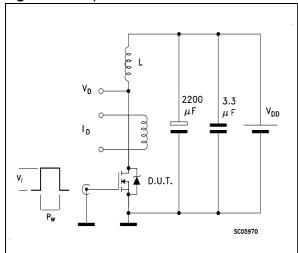


Fig. 3: Switching Times Test Circuits For Resistive Load

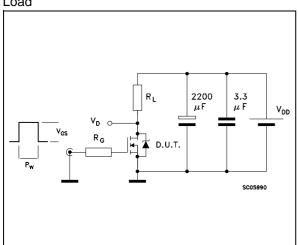


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

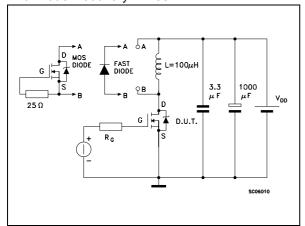


Fig. 2: Unclamped Inductive Waveform

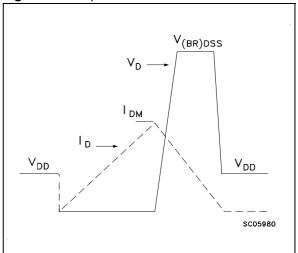
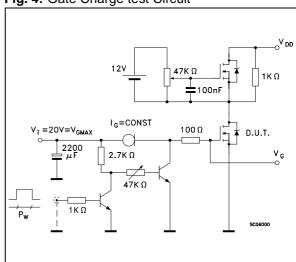
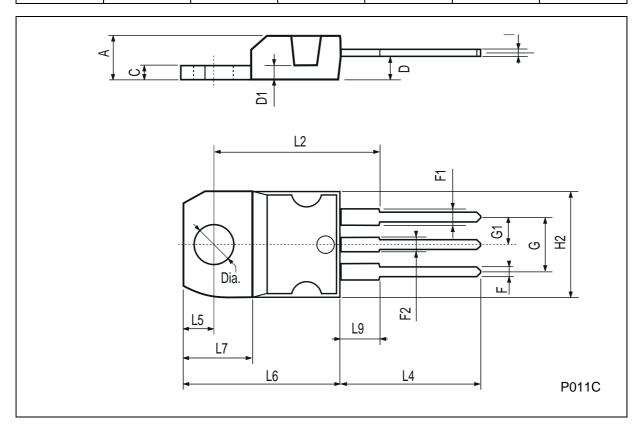


Fig. 4: Gate Charge test Circuit



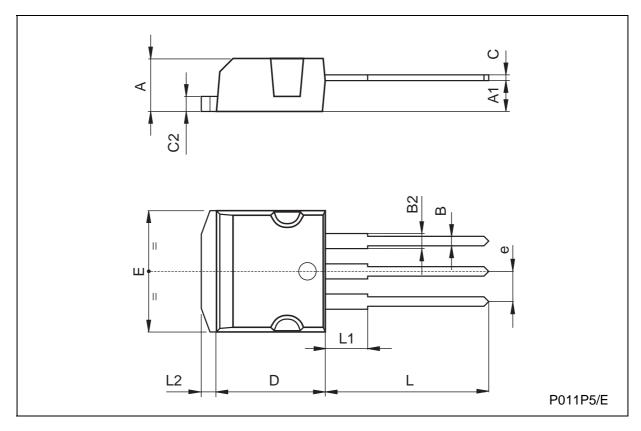
TO-220 MECHANICAL DATA

DIM.		mm			inch	
DINI.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А	4.40		4.60	0.173		0.181
С	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
Е	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



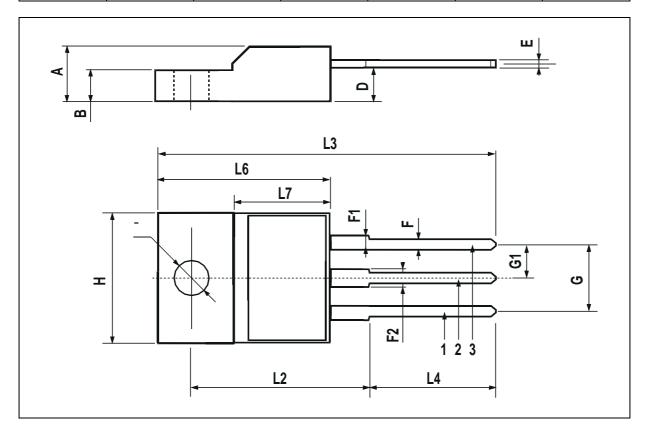
TO-262 (I²PAK) MECHANICAL DATA

DIM.		mm			inch	
D 11111.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
Α	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
В	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
С	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
е	2.4		2.7	0.094		0.106
E	10		10.4	0.393		0.409
L	13.1		13.6	0.515		0.531
L1	3.48		3.78	0.137		0.149
L2	1.27		1.4	0.050		0.055



TO-220FP MECHANICAL DATA

DIM.		mm			inch	
DIIVI.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А	4.4		4.6	0.173		0.181
В	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
Е	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
Н	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126





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