



STB55NF03L

N-CHANNEL 30V - 0.01 Ω - 55A D²PAK STripFET™ POWER MOSFET

TYPE	V _{DSS}	R _{D(on)}	I _D
STB55NF03L	30 V	< 0.013 Ω	55 A

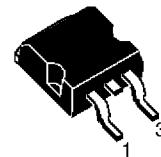
- TYPICAL R_{D(on)} = 0.01 Ω
- OPTIMIZED FOR HIGH SWITCHING OPERATIONS
- LOW GATE CHARGE
- LOGIC LEVEL GATE DRIVE

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

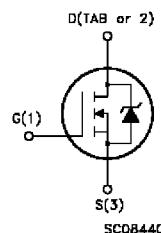
- LOW VOLTAGE DC-DC CONVERTERS
- HIGH CURRENT, HIGH SPEED SWITCHING
- HIGH EFFICIENCY SWITCHING CIRCUITS



D²PAK
TO-263

ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL

INTERNAL SCHEMATIC DIAGRAM



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 k Ω)	30	V
V _{GS}	Gate-source Voltage	\pm 20	V
I _D	Drain Current (continuous) at T _c = 25 °C	55	A
I _D	Drain Current (continuous) at T _c = 100 °C	39	A
I _{DM(•)}	Drain Current (pulsed)	220	A
P _{tot}	Total Dissipation at T _c = 25 °C	80	W
	Derating Factor	0.53	W/°C
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area

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THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	1.875	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	62.5	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose		300	°C

ELECTRICAL CHARACTERISTICS ($T_{case} = 25$ °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} = ± 20 V			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} I _D = 250 μA	1		2.5	V
R _{D(on)}	Static Drain-source On Resistance	V _{GS} = 10V I _D = 27.5 A V _{GS} = 4.5V I _D = 27.5 A		0.01 0.015	0.013 0.021	Ω Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{D(on)max} V _{GS} = 10 V	55			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{D(on)max} I _D = 27.5 A		40		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0		1450 390 150		pF pF 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	$V_{DD} = 15 \text{ V}$ $I_D = 27.5 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 4.5 \text{ V}$ (Resistive Load, see fig. 3)		25 280		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 24 \text{ V}$ $I_D = 55 \text{ A}$ $V_{GS} = 4.5 \text{ V}$		25 11 12	35	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 15 \text{ V}$ $I_D = 27.5 \text{ A}$ $R_G = 4.7 \Omega$ $V_{GS} = 4.5 \text{ V}$ (Resistive Load, see fig. 3)		40 60		ns ns

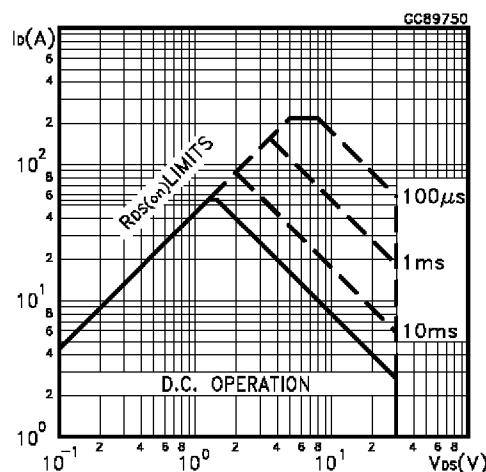
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				55 220	A A
$V_{SD} (\ast)$	Forward On Voltage	$I_{SD} = 55 \text{ A}$ $V_{GS} = 0$			1.3	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 55 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 15 \text{ V}$ $T_j = 150 \text{ }^\circ\text{C}$		45		ns
Q_{rr}	Reverse Recovery Charge	(see test circuit, fig. 5)		52		nC
I_{RRM}	Reverse Recovery Current			2.3		A

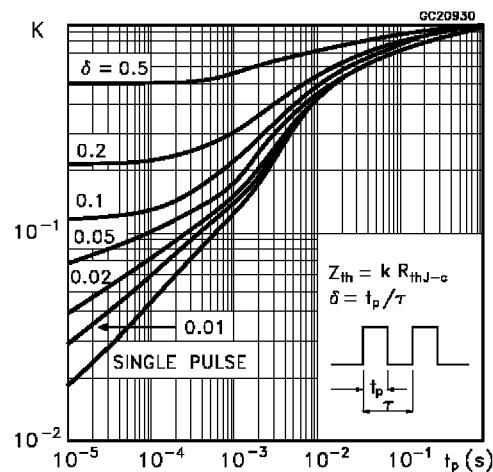
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(•) Pulse width limited by safe operating area

Safe Operating Area

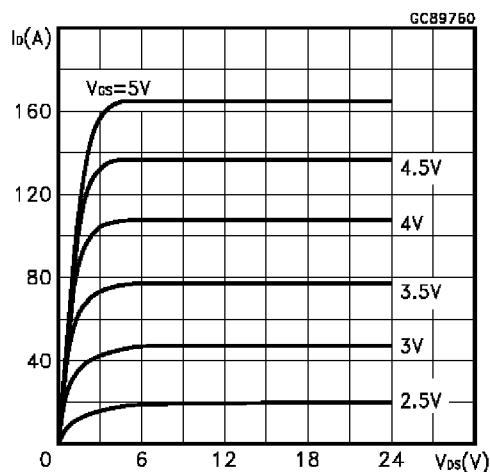


Thermal Impedance

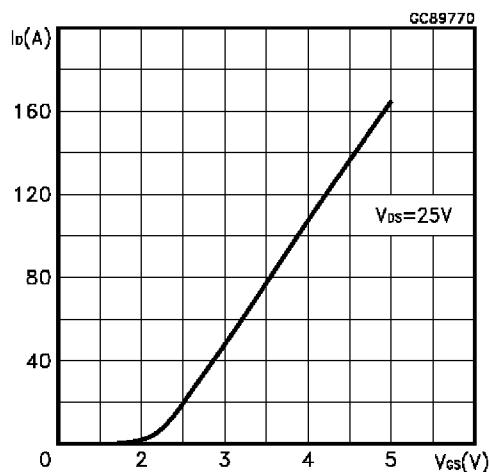


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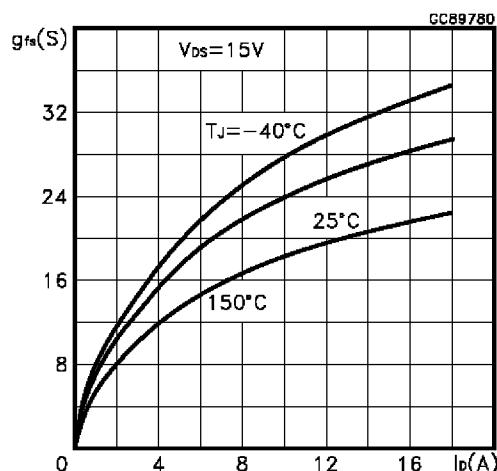
Output Characteristics



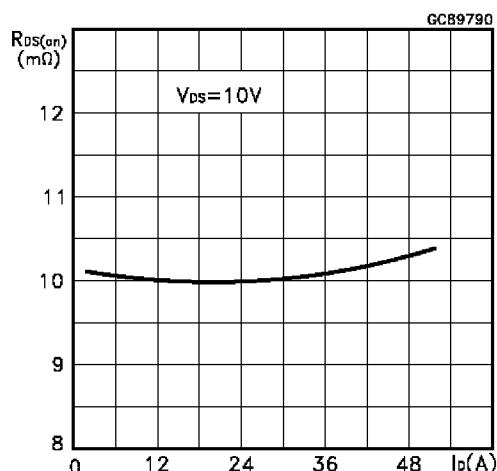
Transfer Characteristics



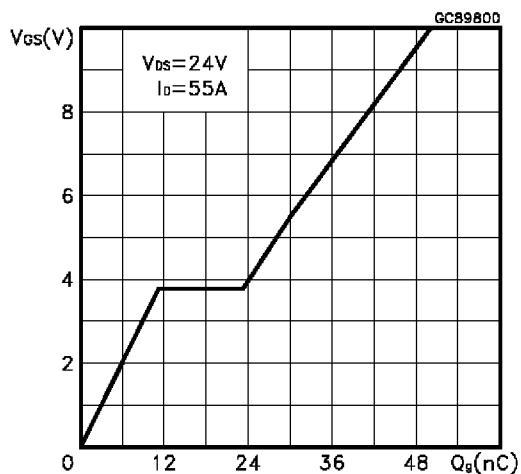
Transconductance



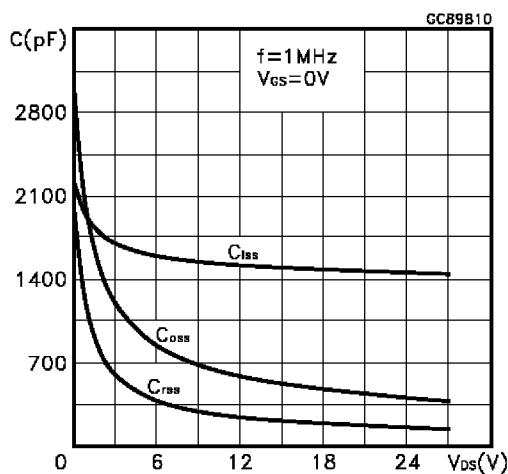
Static Drain-source On Resistance



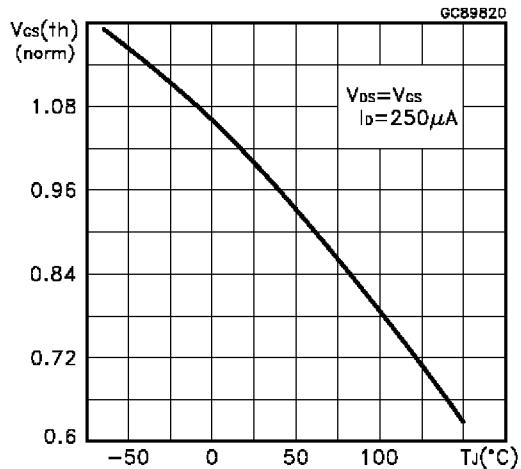
Gate Charge vs Gate-source Voltage



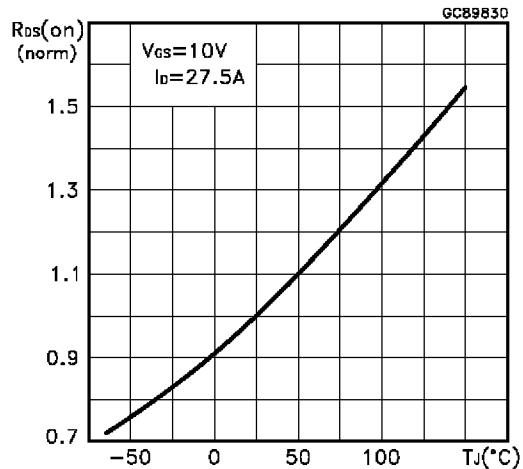
Capacitance Variations



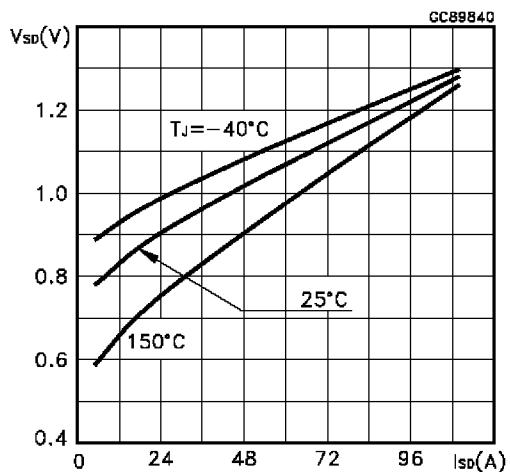
Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



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Fig. 1: Unclamped Inductive Load Test Circuit

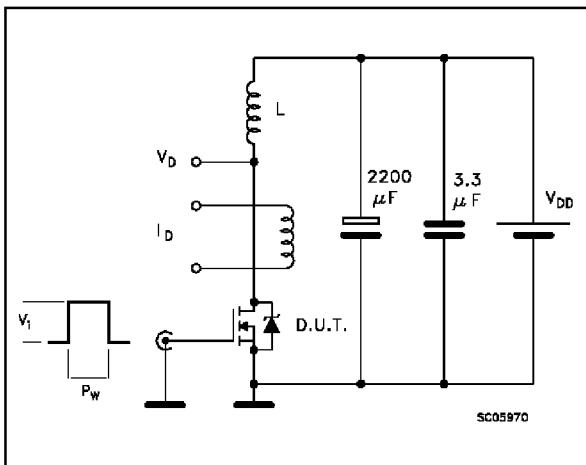


Fig. 2: Unclamped Inductive Waveform

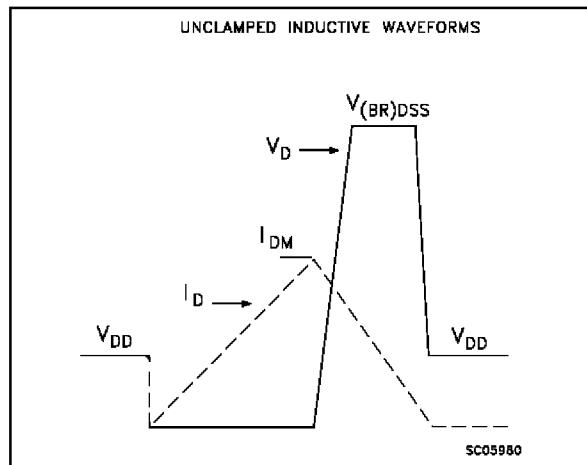


Fig. 3: Switching Times Test Circuits For Resistive Load

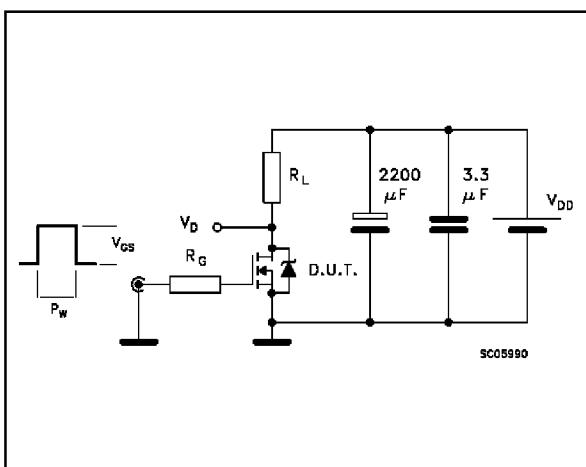


Fig. 4: Gate Charge test Circuit

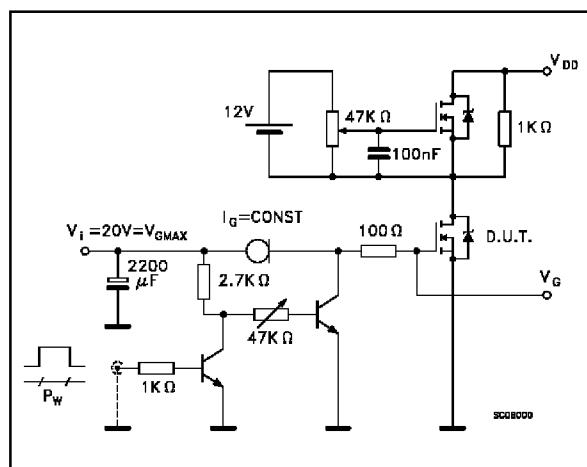
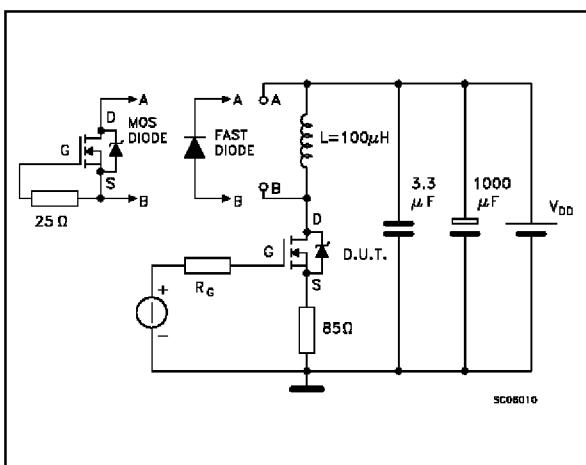
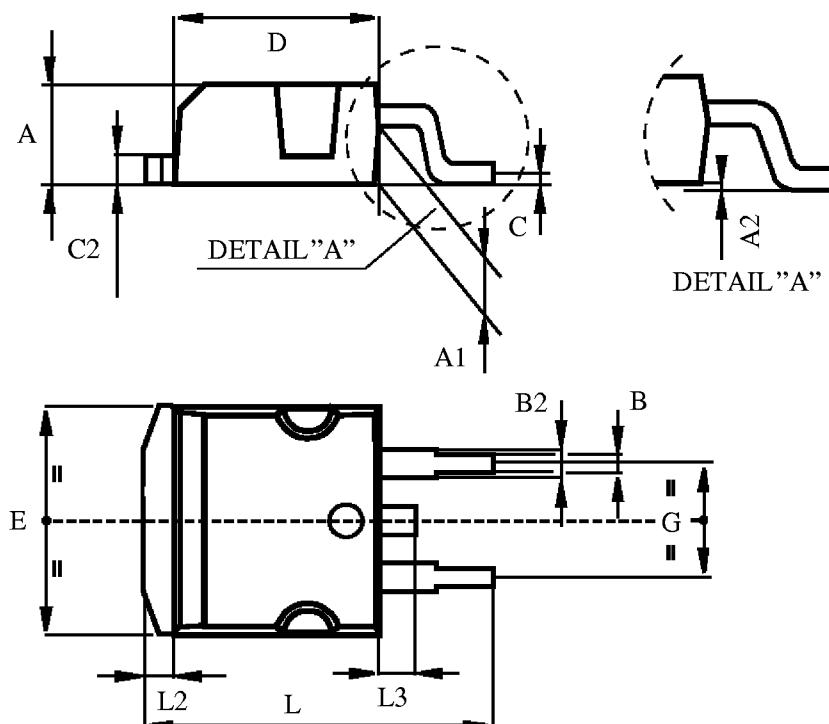


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-263 (D²PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.21		1.36	0.047		0.053
D	8.95		9.35	0.352		0.368
E	10		10.4	0.393		0.409
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068



P011P6/E