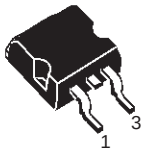
STB55NE06

N-CHANNEL 60V - 0.19Ω - 55A D^2PAK
STripFET™ POWER MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STB55NE06	60 V	<0.022 Ω	55 A

- TYPICAL $R_{DS}(on)$ = 0.019Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 ^{0}C
- HIGH dv/dt CAPABILITY
- APPLICATION ORIENTED CHARACTERIZATION
- FOR THROUGH-HOLE VERSION CONTACT SALES OFFICE

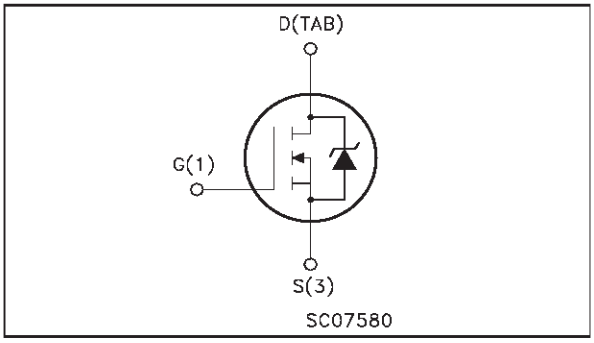


D^2PAK
TO-263
(suffix"T4")

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 on-resistance, rugged avalance characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS
- DC MOTOR CONTROL
- DC-DC & DC-AC CONVERTERS
- SYNCHRONOUS RECTIFICATION

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	60	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	60	V
V_{GS}	Gate- source Voltage	±20	V
I_D	Drain Current (continuos) at T_C = 25°C	55	A
I_D	Drain Current (continuos) at T_C = 100°C	39	A
I_{DM}(•)	Drain Current (pulsed)	220	A
P_{tot}	Total Dissipation at T_C = 25°C	130	W
	Derating Factor	0.96	W/°C
dv/dt (2)	Peak Diode Recovery voltage slope	7	V/ns
T_{stg}	Storage Temperature	–60 to 175	°C
T_j	Max. Operating Junction Temperature	175	°C

(•)Pulse width limited by safe operating area.

(2) I_{SD} ≤55A, di/dt ≤300A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ $T_{JMAX.}$

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	1.15	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W
$R_{thc\text{-}sink}$	Thermal Resistance Case-sink	Typ	0.5	°C/W
T_j	Maximum Lead Temperature For Soldering Purpose		300	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	55	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 25 V)	200	mJ

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 = 25 µA, 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 °C			1 10	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ I_D = 250 µA	2	3	4	V
$I_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V I_D = 27.5 A		0.019	0.022	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ V_{GS} = 10V	55			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, I_D = 27.5 A	25	35		S
C_{iss}	Input Capacitance	V_{DS} = 25V f = 1 MHz V_{GS} = 0		3050	4000	pF
C_{oss}	Output Capacitance			380	500	pF
C_{rss}	Reverse Transfer Capacitances			100	130	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} = 30V I_D = 27.5 A R_G = 4.7 Ω V_{GS} = 10 V (see test circuit, Figure 3)		30 120	40 160	ns ns
Q_g	Total Gate Charge	V_{DD}=48V I_D=55A V_{GS}=10V		80	105	nC
Q_{gs}	Gate-Source Charge			13		nC
Q_{gd}	Gate-Drain Charge			25		nC

SWITCHING OFF

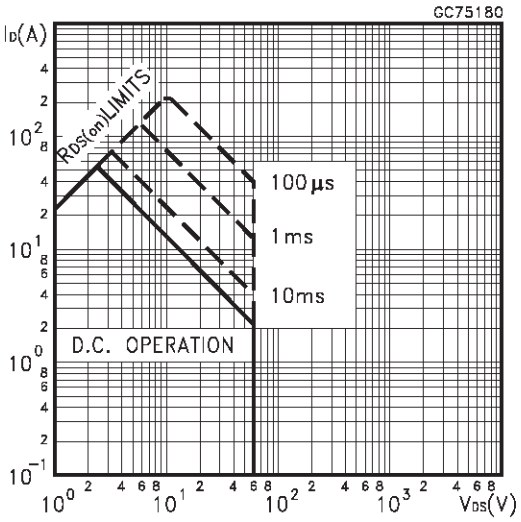
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time Rise Time	V_{DD} = 48 V I_D = 55 A R_G = 4.7 Ω V_{GS} = 10 V		55	70	ns
t_r	Fall Time	(see test circuit, Figure 5)		155		ns
t_c	Cross-over Time					

SOURCE DRAIN DIODE

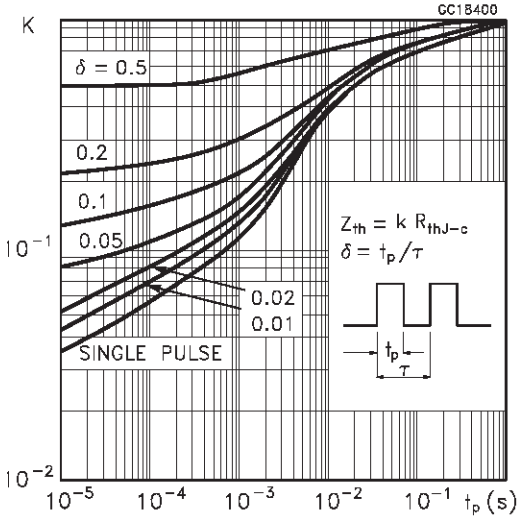
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				55	A
I_{SDM} (•)	Source-drain Current (pulsed)				220	A
V_{SD} (*)	Forward On Voltage	I_{SD} = 60A V_{GS} = 0			1.5	V
t_{rr}	Reverse Recovery Time	I_{SD} = 55 A di/dt = 100 A/µs V_{DD} = 30V T_j = 150 °C		110		ns
Q_{rr}	Reverse Recovery Charge	(see test circuit, Figure 3)		430		µC
I_{RRM}	Reverse Recovery Current			7.5		A

(*)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(•)Pulse width limited by safe operating area.

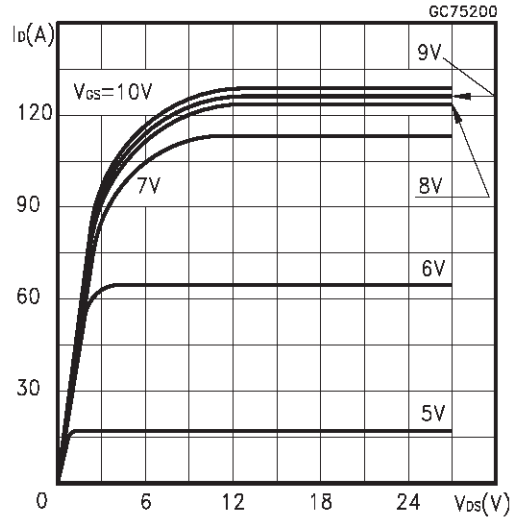
Safe Operating Area



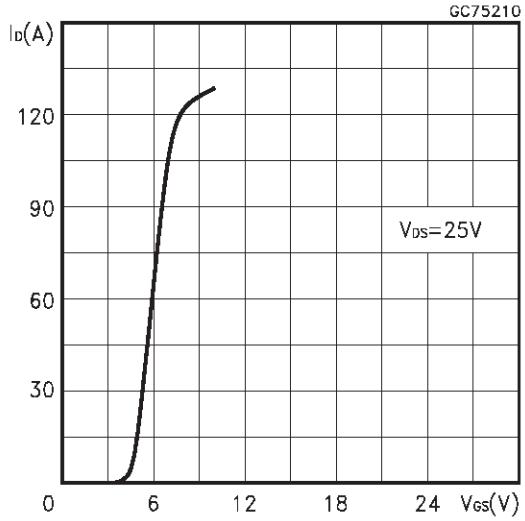
Thermal Impedance



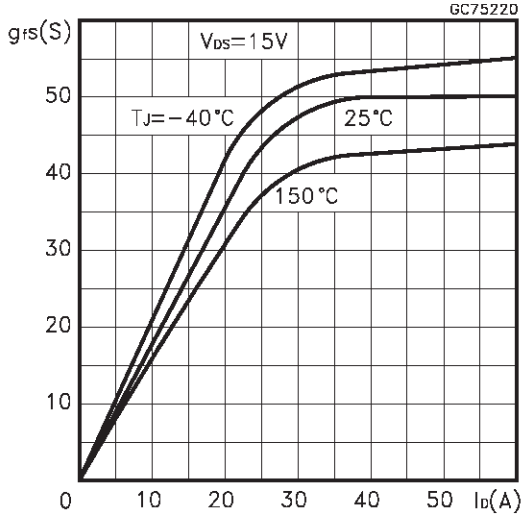
Output Characteristics



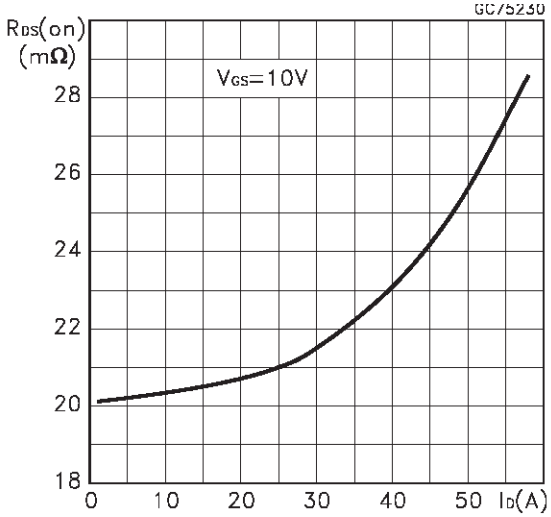
Transfer Characteristics



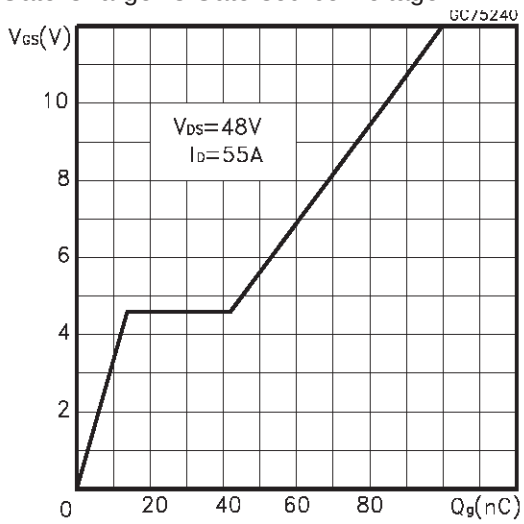
Transconductance



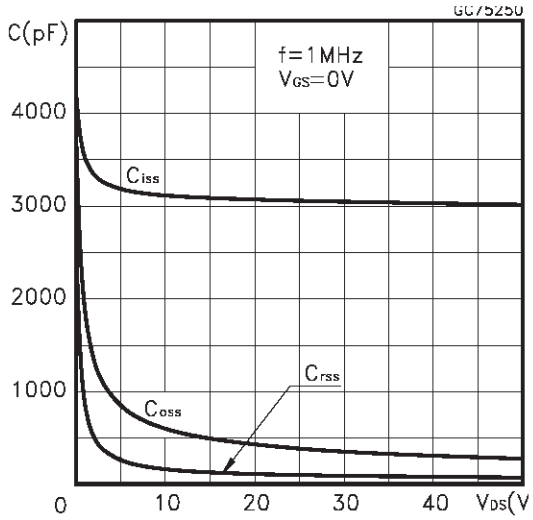
Static Drain-source On Resistance



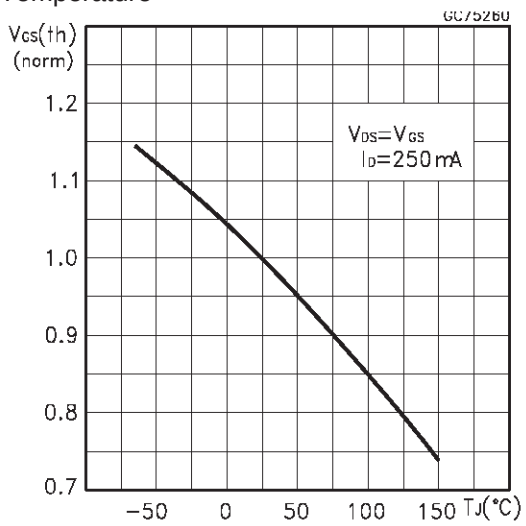
Gate Charge vs Gate-source Voltage



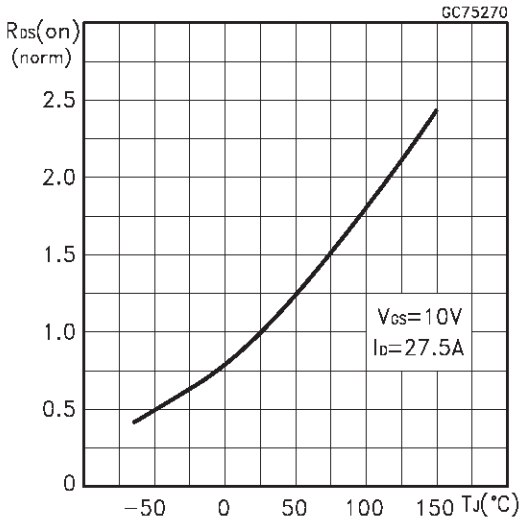
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

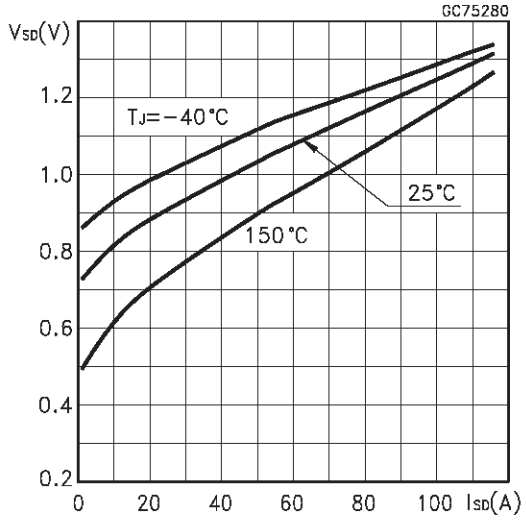


Fig. 1: Unclamped Inductive Load Test Circuit

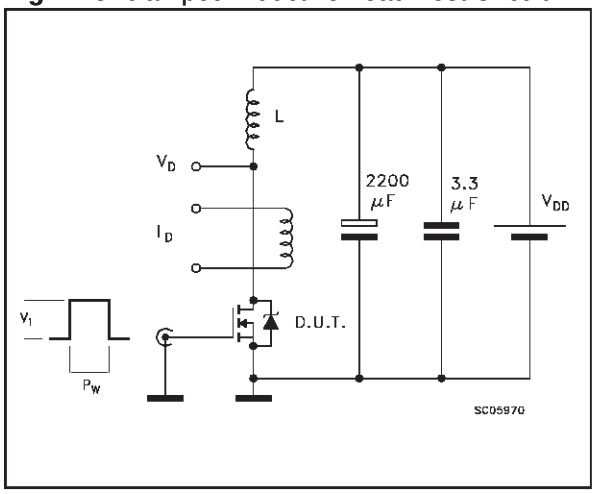


Fig. 2: Unclamped Inductive Waveform

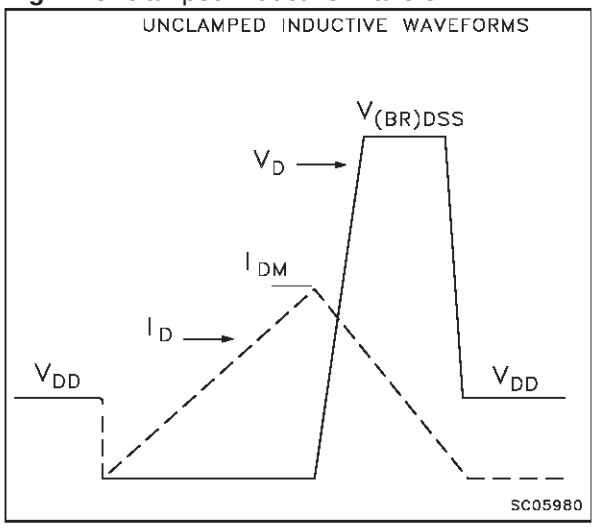


Fig. 3: Switching Times Test Circuits For Resistive Load

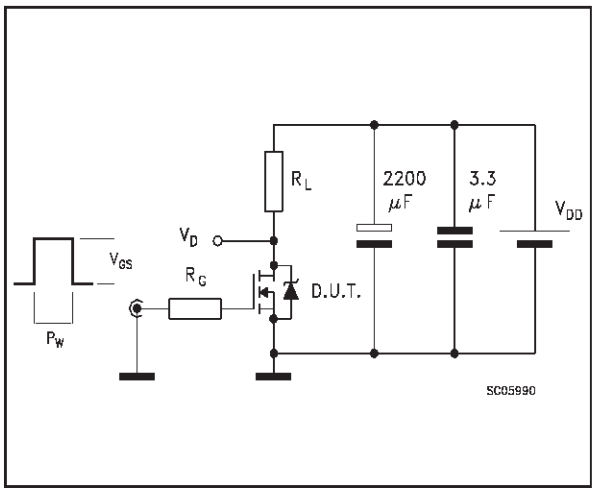


Fig. 4: Gate Charge test Circuit

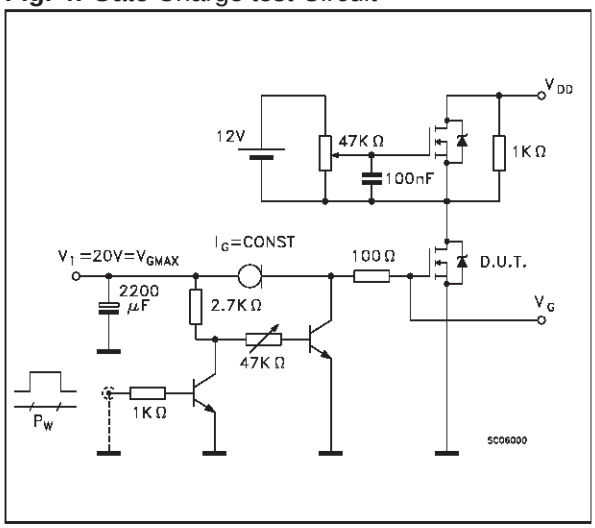
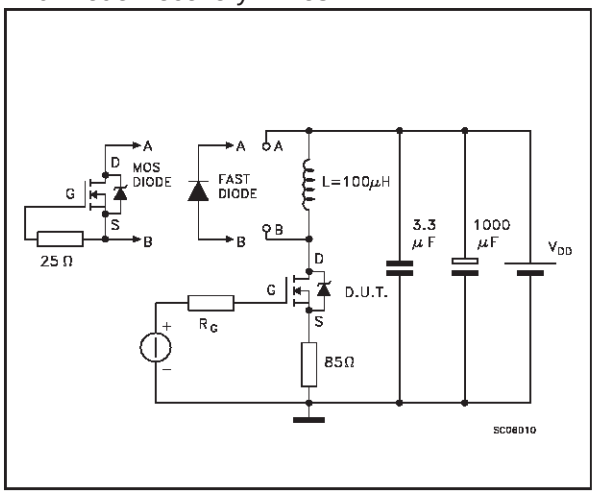


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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
A2	0.03		0.23	0.001		0.009
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	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0º		8º