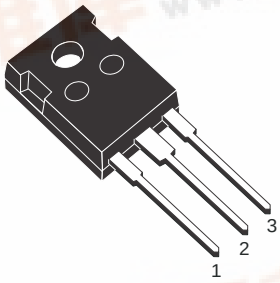
STW80NF55-08

N-CHANNEL 55V - 0.0065Ω - 80A TO-247
STripFET™ POWER MOSFET

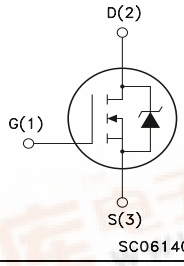
TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STW80NF55-08	55 V	< 0.008 Ω	80 A

- TYPICAL $R_{DS}(on)$ = 0.0065Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW THRESHOLD DRIVE



TO-247

INTERNAL SCHEMATIC DIAGRAM



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

- DC-AC & DC-DC CONVERTERS
- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	55	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	55	V
V_{GS}	Gate- source Voltage	±20	V
I_D (*)	Drain Current (continuous) at T_C = 25°C	80	A
I_D	Drain Current (continuous) at T_C = 100°C	80	A
I_{DM} (●)	Drain Current (pulsed)	320	A
P_{TOT}	Total Dissipation at T_C = 25°C	300	W
	Derating Factor	2	W/°C
E_{AS} (1)	Single Pulse Avalanche Energy	870	mJ
T_{stg}	Storage Temperature	–65 to 175	°C
T_j	Max. Operating Junction Temperature	175	°C

(●) Pulse width limited by safe operating area

(1) Starting T_j = 25°C, I_D = 40A, V_{DD} = 40V
(*) Current Limited by wire bonding

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.5	°C/W
Rthj-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	55			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

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V, I_D = 40 A		0.0065	0.008	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	V_{DS} > 2.5 V, I_D =18 A		20		S
C_{iss}	Input Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		3850		pF
C_{oss}	Output Capacitance			800		pF
C_{rss}	Reverse Transfer Capacitance			250		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = 27V, I_D = 40A		25		ns
t_r	Rise Time	R_G = 4.7Ω V_{GS} = 10V (see test circuit, Figure 3)		85		ns
Q_g	Total Gate Charge	V_{DD} = 80V, I_D = 80A,		115	150	nC
Q_{gs}	Gate-Source Charge	V_{GS} = 10V		24		nC
Q_{gd}	Gate-Drain Charge			46		nC

SWITCHING OFF

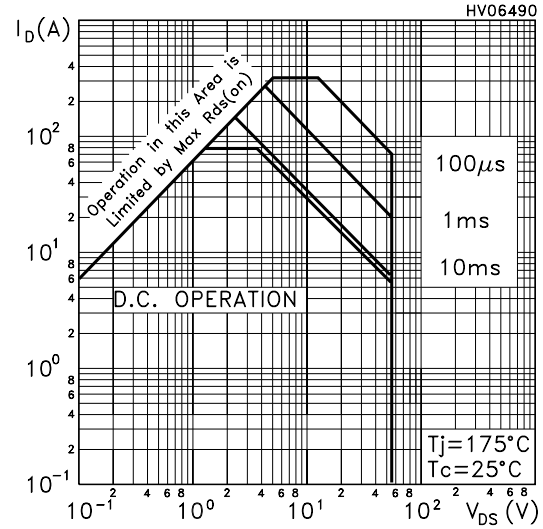
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	V_{DD} = 27V, I_D = 40A,		70		ns
t_f	Fall Time	R_G = 4.7Ω, V_{GS} = 10V (see test circuit, Figure 3)		25		ns
$t_{d(off)}$	Off-voltage Rise Time	Vclamp =44V, I_D =80A		85		ns
t_f	Fall Time	R_G = 4.7Ω, V_{GS} = 10V		75		ns
t_c	Cross-over Time	(see test circuit, Figure 5)		110		ns

SOURCE DRAIN DIODE

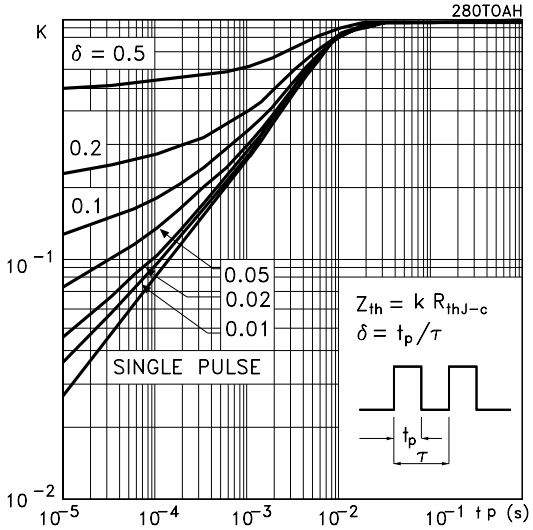
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				80	A
I_{SDM} (1)	Source-drain Current (pulsed)				320	A
V_{SD} (2)	Forward On Voltage	I_{SD} = 80A, V_{GS} = 0			1.5	V
t_{rr}	Reverse Recovery Time	I_{SD} = 80A, di/dt = 100A/µs,		80		ns
Q_{rr}	Reverse Recovery Charge	V_{DD} = 50V, T_j = 150°C		250		nC
I_{RRM}	Reverse Recovery Current	(see test circuit, Figure 5)		6.4		A

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

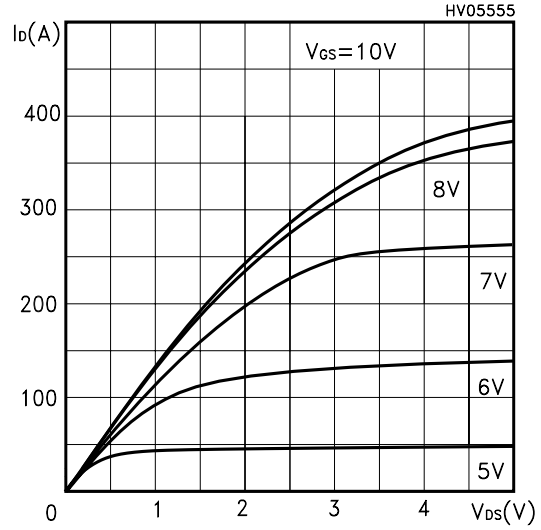
Safe Operating Area



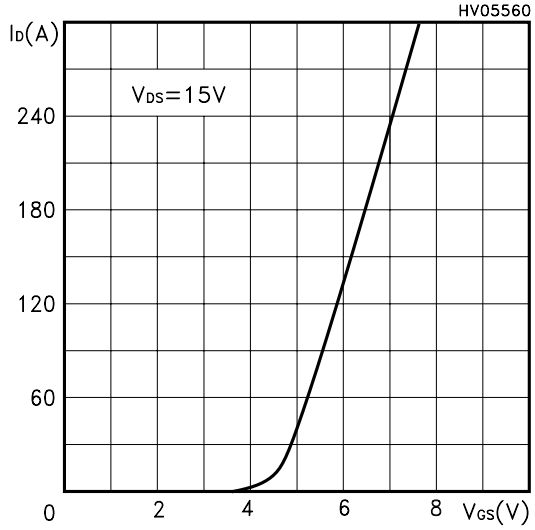
Thermal Impedance



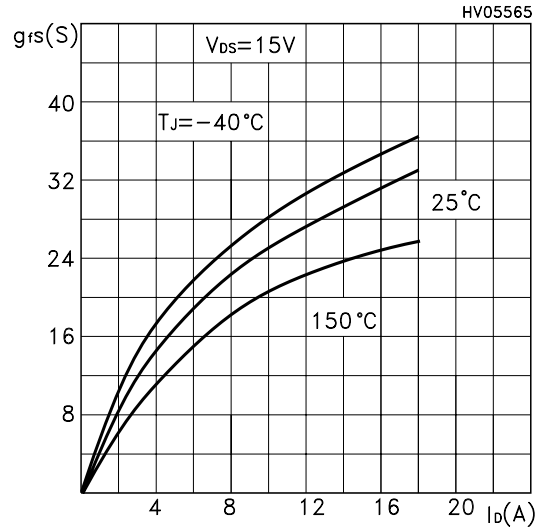
Output Characteristics



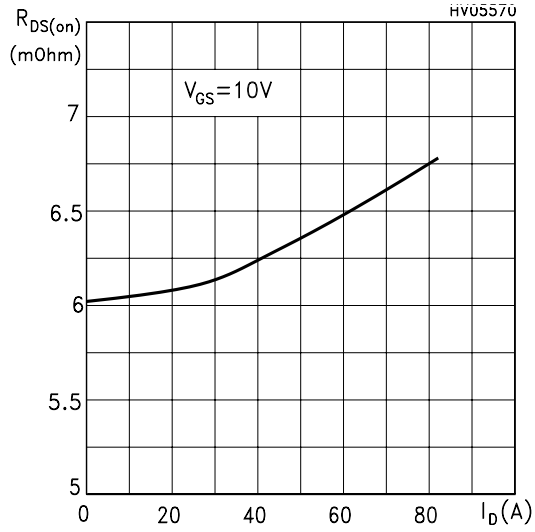
Tranfer Characteristics



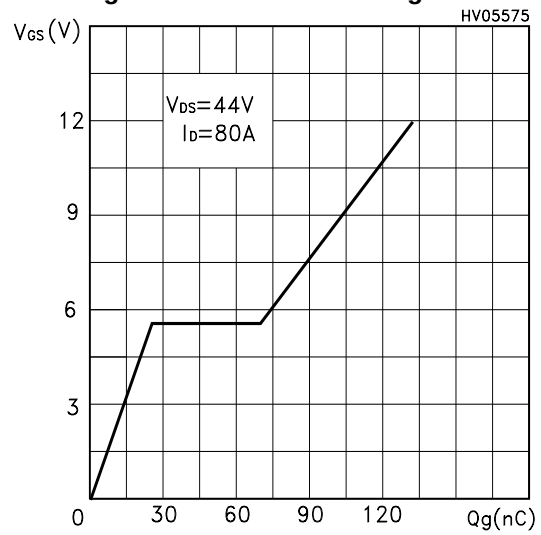
Tranconductance



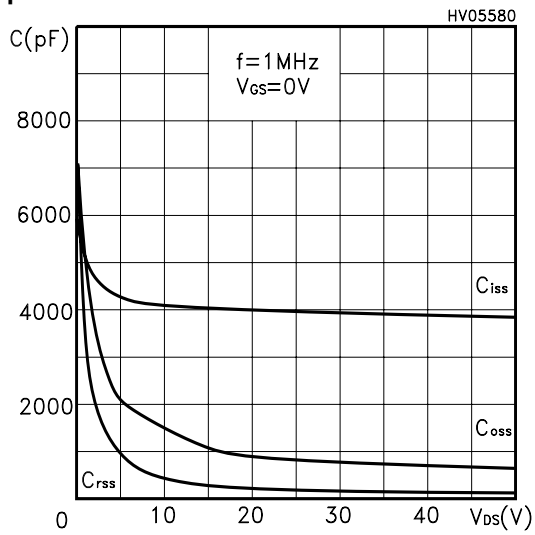
Static Drain-Source On Resistance



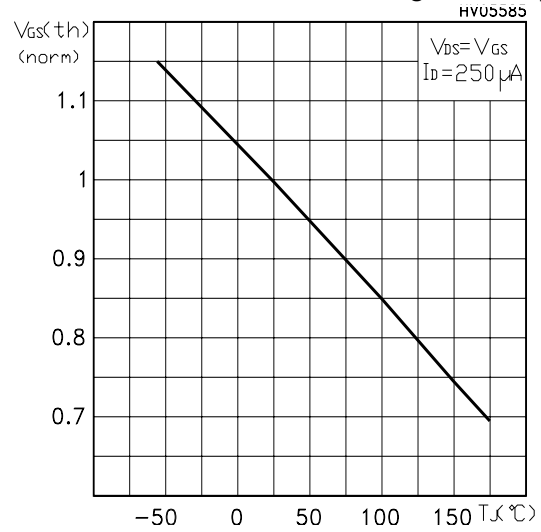
Gate Charge vs Gate-source Voltage



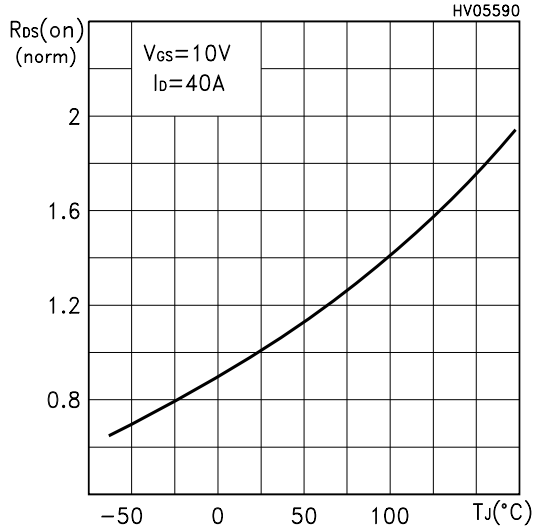
Capacitance Variations



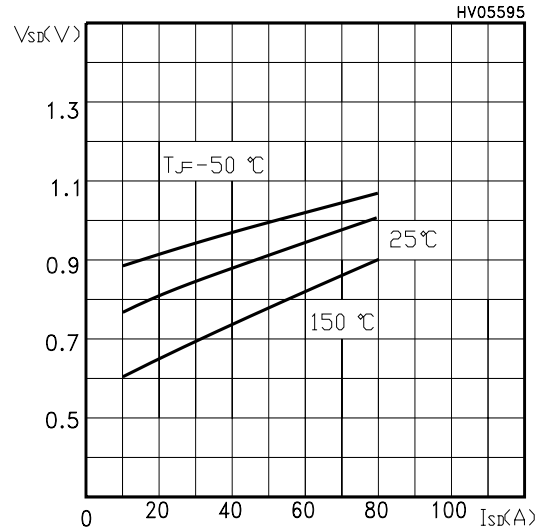
Normalized Gate Thereshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

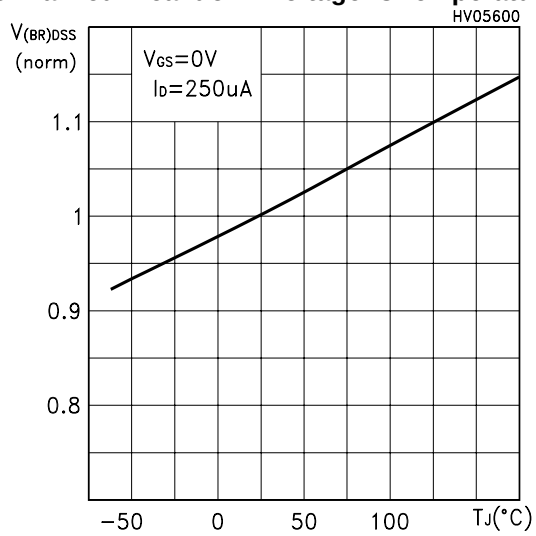


Fig. 1: Unclamped Inductive Load Test Circuit

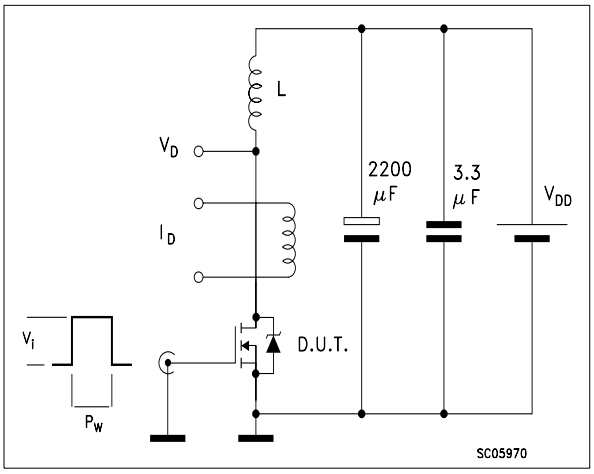


Fig. 2: Unclamped Inductive Waveform

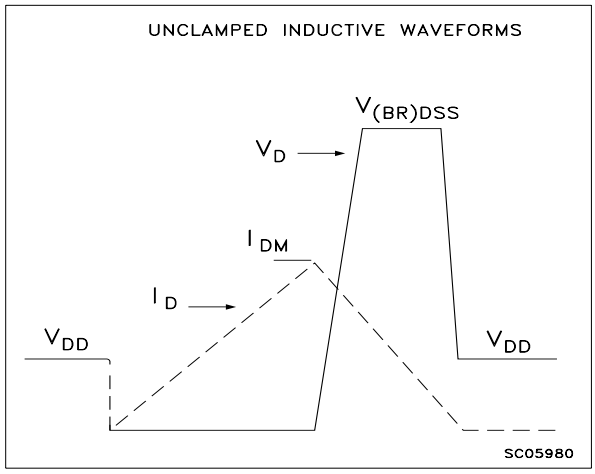


Fig. 3: Switching Times Test Circuit For Resistive Load

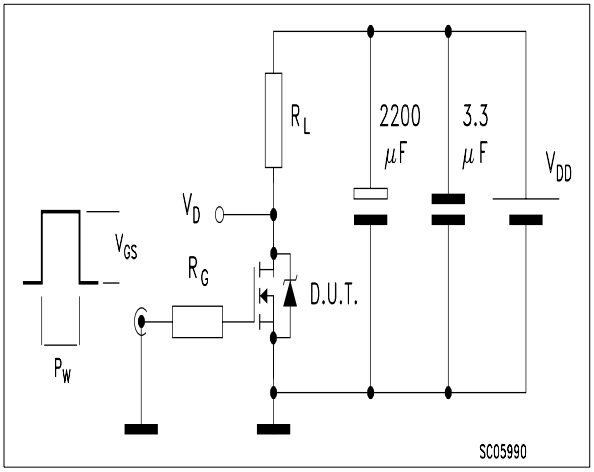


Fig. 4: Gate Charge test Circuit

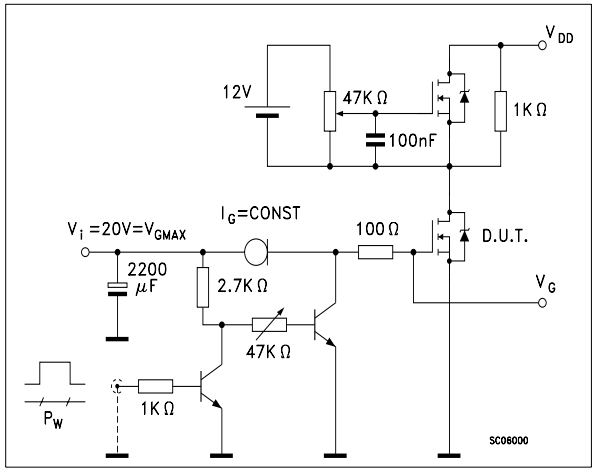
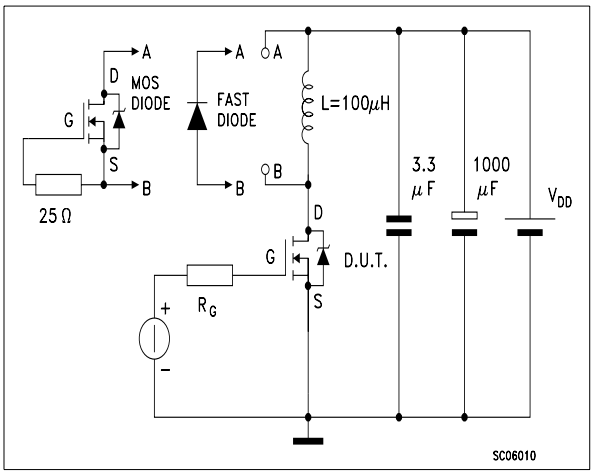


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
D	2.20		2.60	0.08		0.10
E	0.40		0.80	0.015		0.03
F	1		1.40	0.04		0.05
F1		3			0.11	
F2		2			0.07	
F3	2		2.40	0.07		0.09
F4	3		3.40	0.11		0.13
G		10.90			0.43	
H	15.45		15.75	0.60		0.62
L	19.85		20.15	0.78		0.79
L1	3.70		4.30	0.14		0.17
L2		18.50			0.72	
L3	14.20		14.80	0.56		0.58
L4		34.60			1.36	
L5		5.50			0.21	
M	2		3	0.07		0.11
V		5º			5º	
V2		60º			60º	
Dia	3.55		3.65	0.14		0.143