

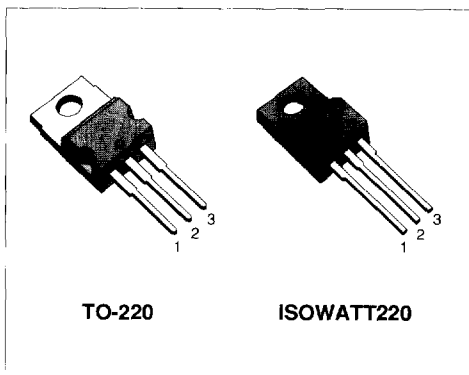
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP55N06	60 V	0.023 Ω	55 A
STP55N06FI	60 V	0.023 Ω	30 A

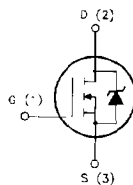
- AVALANCHE RUGGEDNESS TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- 175°C OPERATING TEMPERATURE FOR STANDARD PACKAGE
- VERY LOW R_{DS(on)}
- APPLICATION ORIENTED CHARACTERIZATION
- ISOLATED PACKAGE UL RECOGNIZED, ISOLATION TO 2000V DC

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- REGULATORS
- DC-DC & DC-AC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- AUTOMOTIVE ENVIRONMENT (INJECTION, ABS, AIR-BAG, LAMPDRIVERS, Etc.)



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP55N06	STP55N06FI	
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 (continuous) at T _C = 25 °C(♯)	55	30	A
I _D	Drain Current (continuous) at T _C = 100 °C	41	19	A
I _{DM} (*)	Drain Current (pulsed)	220	220	A
P _{tot}	Total Dissipation at T _C = 25 °C	150	40	W
	Derating Factor	1	0.32	W/°C
T _{stg}	Storage Temperature	-65 to 175	-65 to 150	°C
T	Max. Operating Junction Temperature	175	150	°C

(*) Pulse width limited by safe operating area

(♯) T_C = 50 °C for TO-220

THERMAL DATA

			TO-220	ISOWATT220	
$R_{\theta(jc)}$	Thermal Resistance Junction-case	Max	1	3.12	°C/W
$R_{\theta(ja)}$	Thermal Resistance Junction-ambient	Max		62.5	°C/W
$R_{\theta(jc-sink)}$	Thermal Resistance Case-sink	Typ		0.5	°C/W
T	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, $\delta < 1\%$)	55	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_J = 25^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 25\text{ V}$)	520	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_J max, $\delta < 1\%$)	130	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive ($T_C = 100^\circ\text{C}$, pulse width limited by T_J max, $\delta < 1\%$)	34	A

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^\circ\text{C}$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\ \mu\text{A}$ $V_{GS} = 0$	60			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$ $T_C = 125^\circ\text{C}$			250 1000	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\ \mu\text{A}$	2		4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$ $I_D = 30\text{ A}$ $V_{GS} = 10\text{ V}$ $I_D = 30\text{ A}$ $T_C = 100^\circ\text{C}$			0.023 0.046	Ω Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10\text{ V}$	55			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (*)$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 30\text{ A}$	16			S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ $V_{GS} = 0$		2500	3000	pF
C_{oss}	Output Capacitance			950	1200	pF
C_{rss}	Reverse Transfer Capacitance			250	350	pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 40\text{ V}$ $I_D = 55\text{ A}$		110	150	ns
t_r	Rise Time	$R_G = 50\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 3)		300	400	ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 40\text{ V}$ $I_D = 55\text{ A}$ $R_G = 50\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 5)		160		A/ μ s
Q_g	Total Gate Charge	$V_{DD} = 25\text{ V}$ $I_D = 30\text{ A}$ $V_{GS} = 10\text{ V}$		65	90	nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$	Off-voltage Rise Time	$V_{DD} = 40\text{ V}$ $I_D = 55\text{ A}$		160	220	ns
t_f	Fall Time	$R_G = 50\ \Omega$ $V_{GS} = 10\text{ V}$		160	220	ns
t_c	Cross-over Time	(see test circuit, figure 5)		320	440	ns

SOURCE DRAIN DIODE

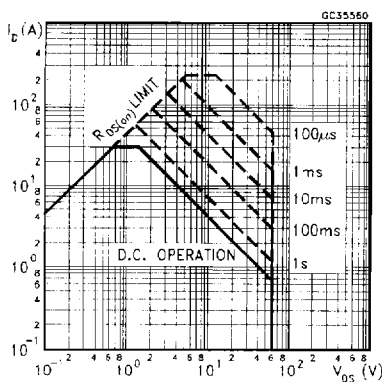
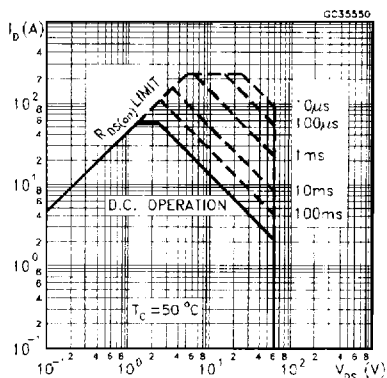
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				55	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				220	A
$V_{SD}(\ast)$	Forward On Voltage	$I_{SD} = 55\text{ A}$ $V_{GS} = 0$			1.6	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 55\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 25\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5)		100		ns
Q_{rr}	Reverse Recovery Charge			0.25		μ C
I_{RRM}	Reverse Recovery Current			5		A

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

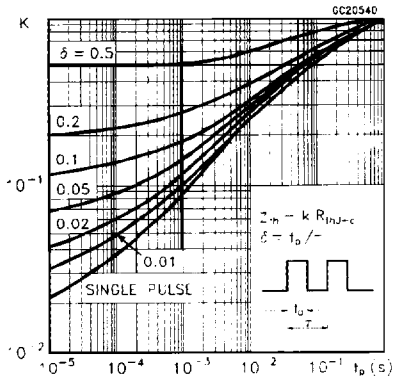
(\bullet) Pulse width limited by safe operating area

Safe Operating Areas For TO-220

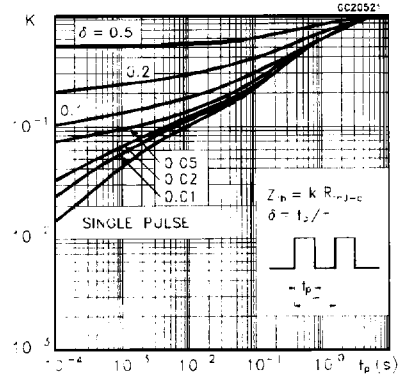
Safe Operating Areas For ISOWATT220



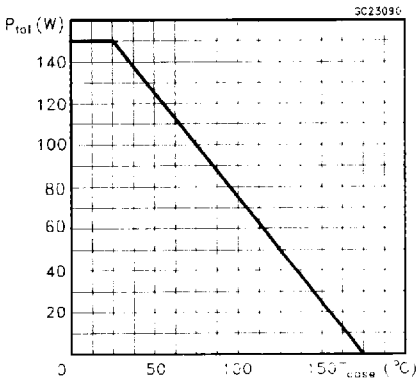
Thermal Impedance For TO-220



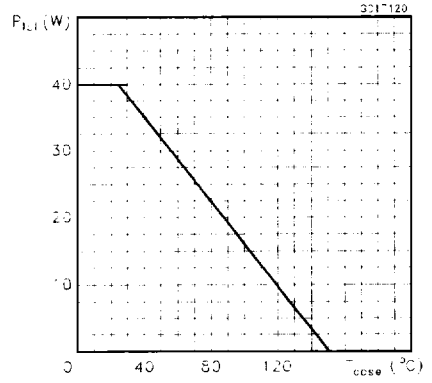
Thermal Impedance For ISOWATT220



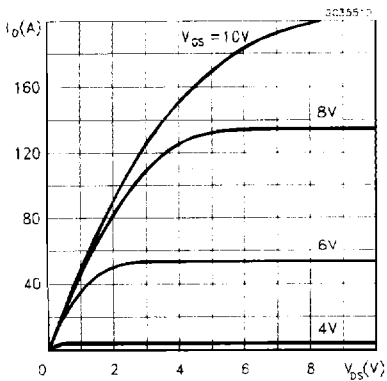
Derating Curve For TO-220



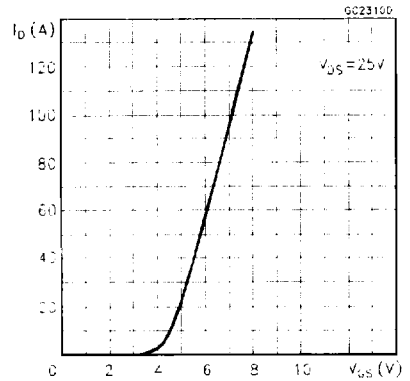
Derating Curve For ISOWATT220



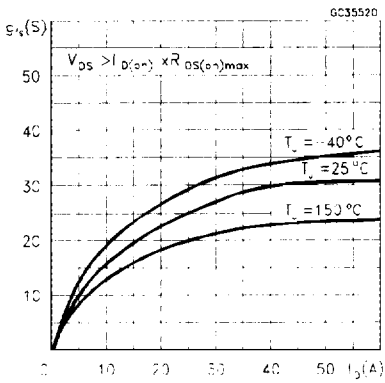
Output Characteristics



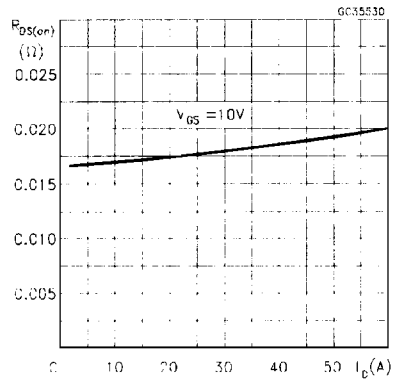
Transfer Characteristics



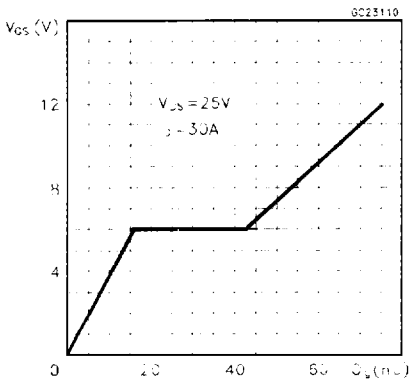
Transconductance



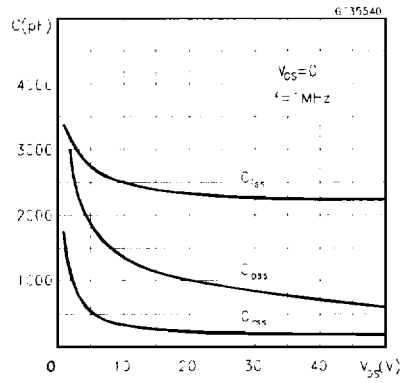
Static Drain-source On Resistance



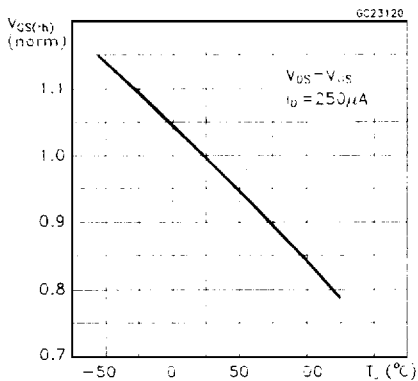
Gate Charge vs Gate-source Voltage



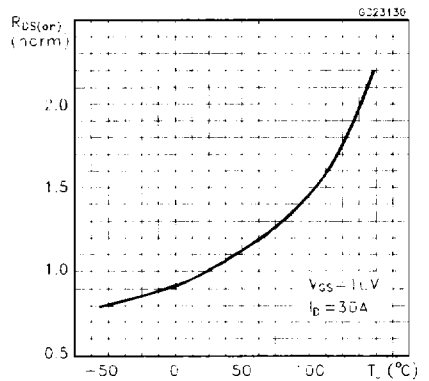
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

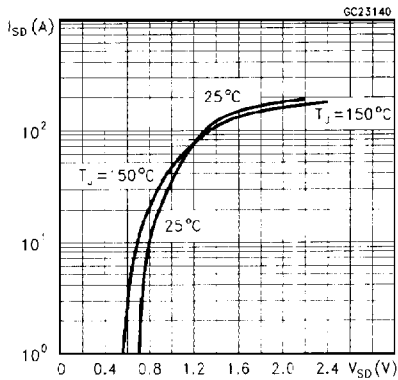


Fig. 2: Unclamped Inductive Waveforms

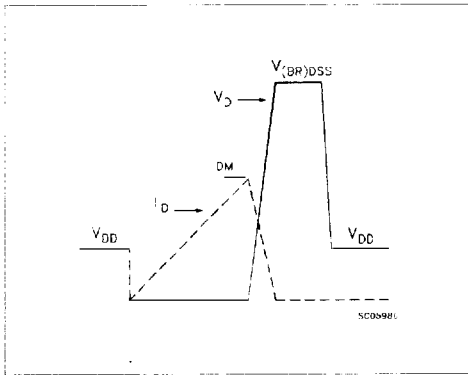


Fig. 4: Gate Charge Test Circuit

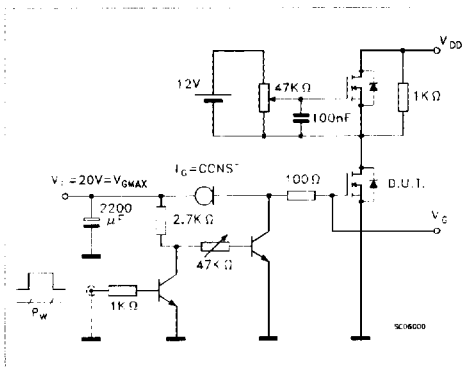


Fig. 1: Unclamped Inductive Load Test Circuits

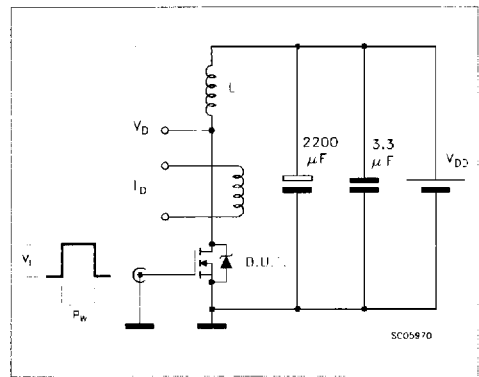


Fig. 3: Switching Times Test Circuits For Resistive Load

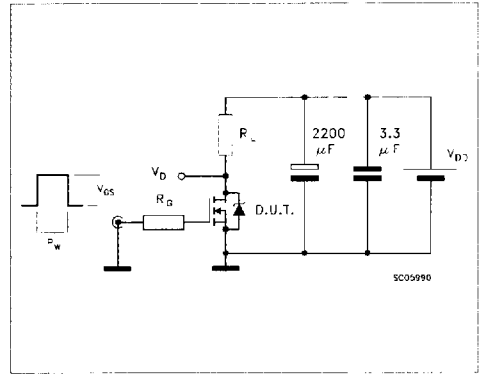


Fig. 5: Test Circuit For Inductive Load Switching And Diode Reverse Recovery Time

