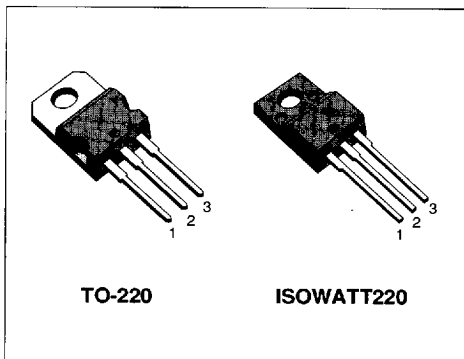


## N - CHANNEL ENHANCEMENT MODE LOW THRESHOLD POWER MOS TRANSISTOR

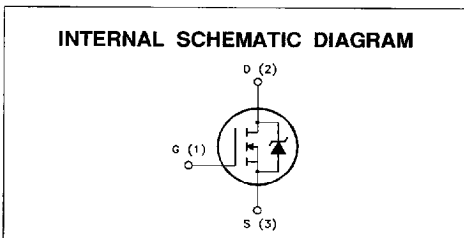
TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STP55N06L	60 V	< 0.023 Ω	55 A
STP55N06LFI	60 V	< 0.023 Ω	30 A

- TYPICAL R<sub>DS(on)</sub> = 0.02 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCH<sup>®</sup>, TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- LOGIC LEVEL COMPATIBLE INPUT
- 175°C OPERATING TEMPERATURE FOR STANDARD PACKAGE
- APPLICATION ORIENTED CHARACTERIZATION



### 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.)



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP55N06L	STP55N06LFI	
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	60		V
V <sub>DGR</sub>	Drain- gate Voltage (R <sub>GS</sub> = 20 kΩ)	60		V
V <sub>GS</sub>	Gate-source Voltage	± 15		V
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 25 °C	55	30	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>c</sub> = 100 °C	38	21	A
I <sub>DM</sub> (*)	Drain Current (pulsed)	220	220	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	150	45	W
	Derating Factor	1	0.3	W/°C
V <sub>ISO</sub>	Insulation Withstand Voltage (DC)	2000		V
T <sub>stg</sub>	Storage Temperature	-65 to 175		°C
T <sub>J</sub>	Max. Operating Junction Temperature	175		°C

(\*) Pulse width limited by safe operating area

## THERMAL DATA

			TO-220	ISOWATT220	
$R_{thj-case}$	Thermal Resistance Junction-case	Max	1	3.33	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	62.5		°C/W
$R_{thc-sink}$	Thermal Resistance Case-sink	Typ	0.5		°C/W
$T_l$	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 $T_j = 25^\circ\text{C}$ , $I_D = I_{AR}$ , $V_{DD} = 25\text{ V}$ )	500	mJ
$E_{AR}$	Repetitive Avalanche Energy (pulse width limited by $T_j$ max, $\delta < 1\%$ )	120	mJ
$I_{AR}$	Avalanche Current, Repetitive or Not-Repetitive ( $T_c = 100^\circ\text{C}$ , pulse width limited by $T_j$ max, $\delta < 1\%$ )	38	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	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 15\text{ V}$			$\pm 100$	nA

ON (\*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\ \mu\text{A}$	1	1.6	2.5	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 5\text{ V}$ $I_D = 27.5\text{ A}$ $V_{GS} = 5\text{ V}$ $I_D = 27.5\text{ A}$ $T_c = 100^\circ\text{C}$		0.02	0.023 0.046	$\Omega$ $\Omega$
$I_{D(on)}$	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	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 27.5\text{ A}$	20	39		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ $V_{GS} = 0$		2700	3600	pF
$C_{oss}$	Output Capacitance			850	1200	pF
$C_{rss}$	Reverse Transfer Capacitance			180	250	pF

# ELECTRICAL CHARACTERISTICS (continued)

## SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 25\text{ V}$ $I_D = 27.5\text{ A}$		150	220	ns
$t_r$	Rise Time	$R_G = 50\ \Omega$ $V_{GS} = 5\text{ V}$ (see test circuit, figure 3)		950	1400	ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 40\text{ V}$ $I_D = 55\text{ A}$ $R_G = 50\ \Omega$ $V_{GS} = 5\text{ V}$ (see test circuit, figure 5)		110		A/ $\mu$ s
$Q_g$	Total Gate Charge	$V_{DD} = 40\text{ V}$ $I_D = 55\text{ A}$ $V_{GS} = 5\text{ V}$		55	80	nC
$Q_{gs}$	Gate-Source Charge			12		nC
$Q_{gd}$	Gate-Drain Charge			28		nC

## SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 40\text{ V}$ $I_D = 55\text{ A}$		185	270	ns
$t_f$	Fall Time	$R_G = 50\ \Omega$ $V_{GS} = 5\text{ V}$		250	350	ns
$t_c$	Cross-over Time	(see test circuit, figure 5)		500	700	ns

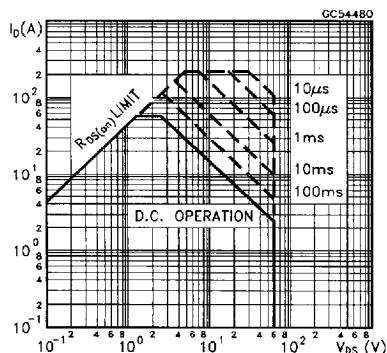
## SOURCE DRAIN DIODE

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	$I_{SD} = 55\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, figure 5)		120		ns
$Q_{rr}$	Reverse Recovery Charge			0.3		$\mu\text{C}$
$I_{RRM}$	Reverse Recovery Current			5		A

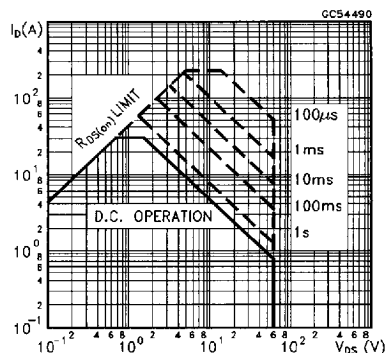
(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

(\*) Pulse width limited by safe operating area

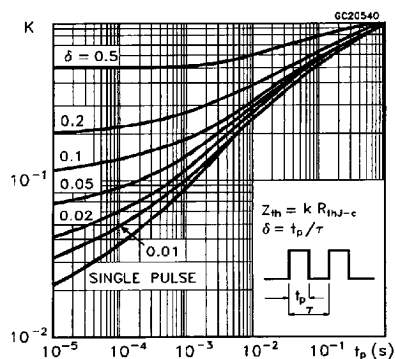
## Safe Operating Areas For TO-220



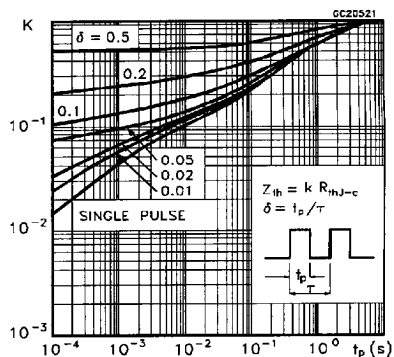
## Safe Operating Areas For ISOWATT220



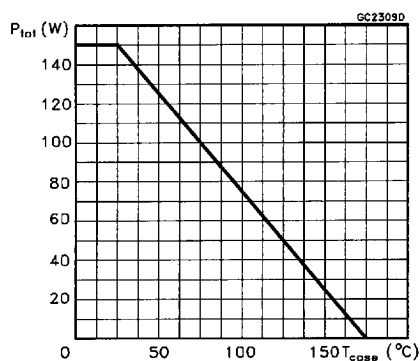
Thermal Impedance For TO-220



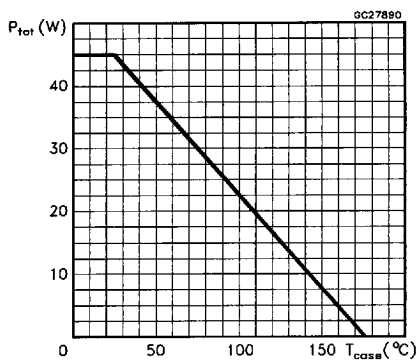
Thermal Impedance For ISOWATT220



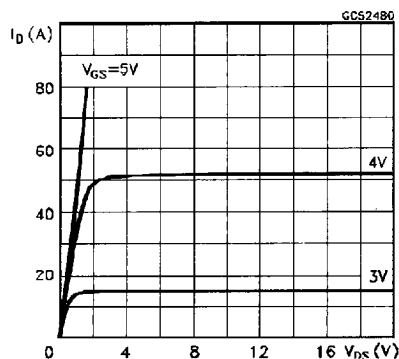
Derating Curve For TO-220



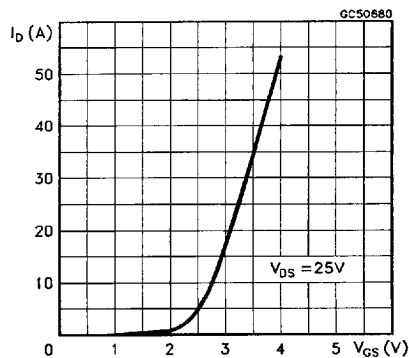
Derating Curve For ISOWATT220



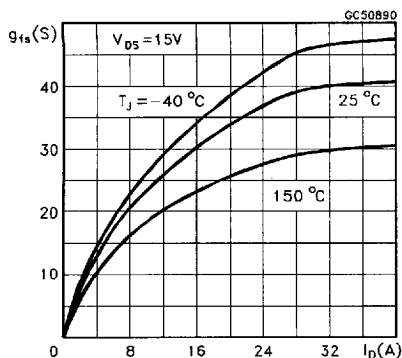
Output Characteristics



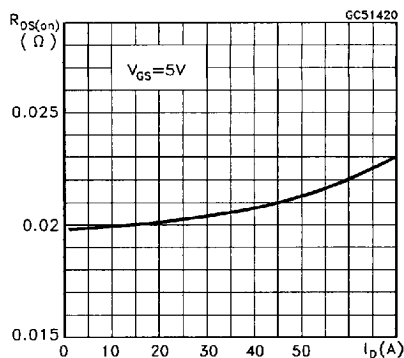
Transfer Characteristics



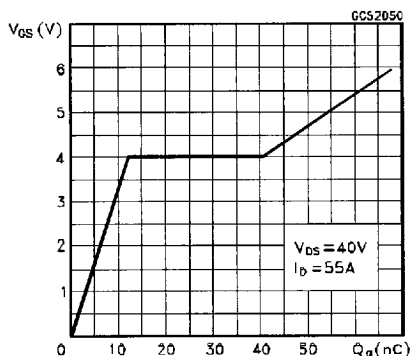
# Transconductance



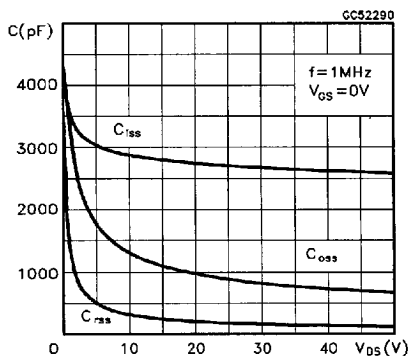
# Static Drain-source On Resistance



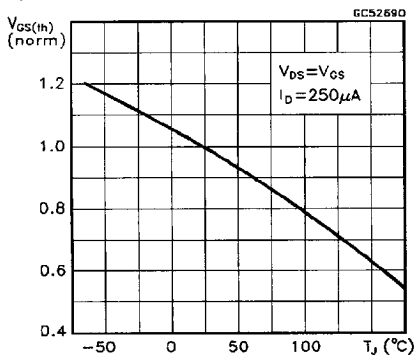
# Gate Charge vs Gate-source Voltage



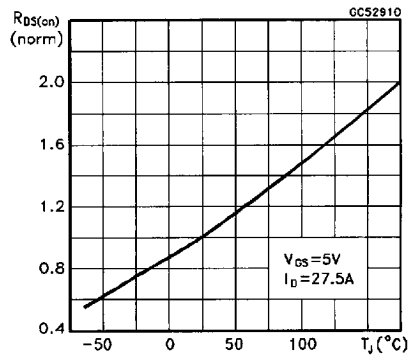
# Capacitance Variations



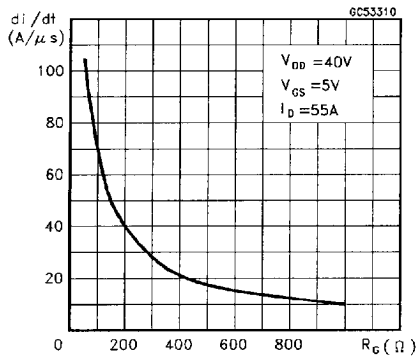
# Normalized Gate Threshold Voltage vs Temperature



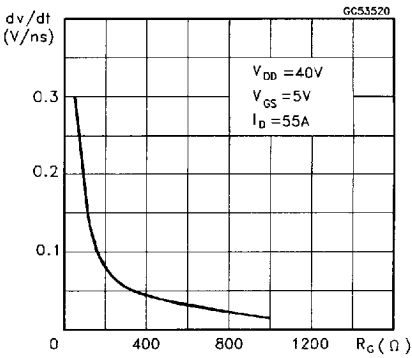
# Normalized On Resistance vs Temperature



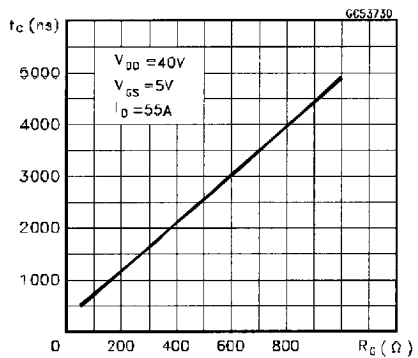
Turn-on Current Slope



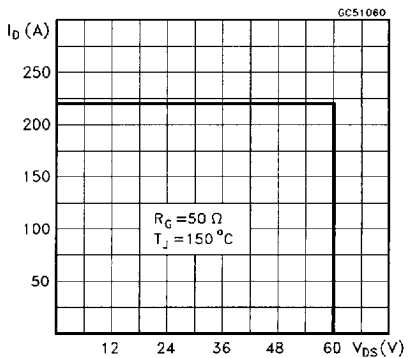
Turn-off Drain-source Voltage Slope



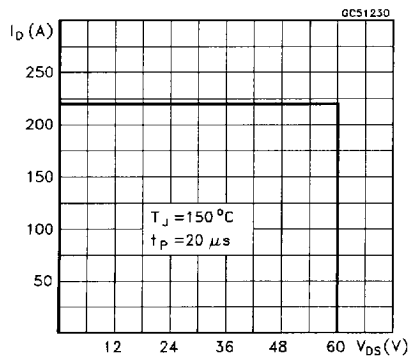
Cross-over Time



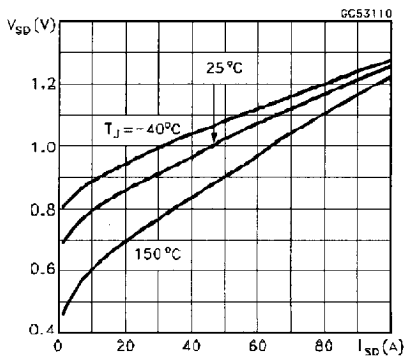
Switching Safe Operating Area

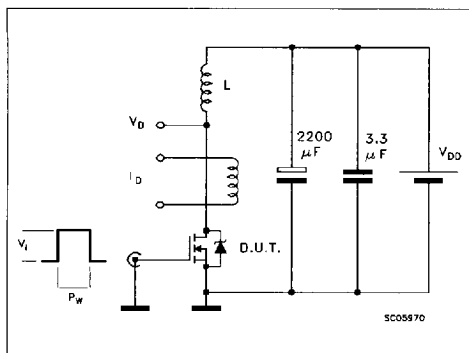
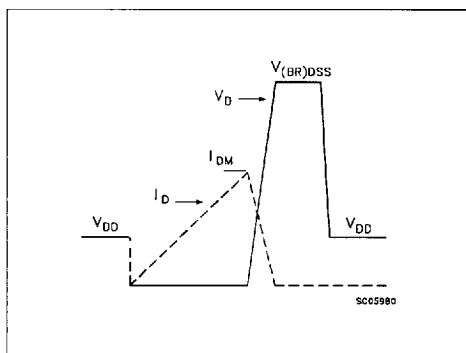
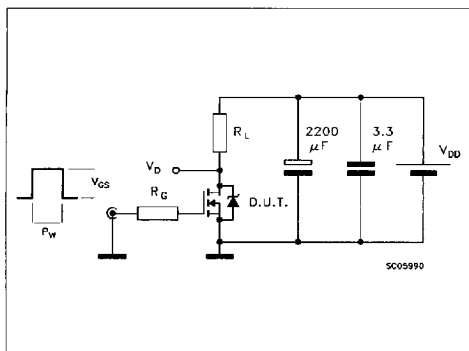
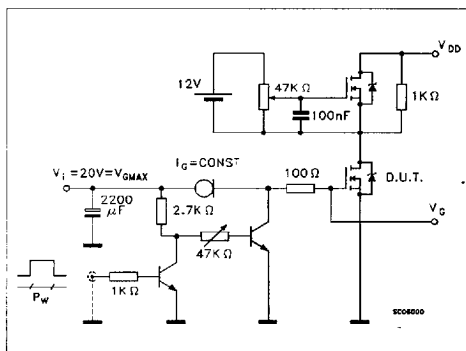


Accidental Overload Area



Source-drain Diode Forward Characteristics



**Fig. 1:** Unclamped Inductive Load Test Circuits**Fig. 2:** Unclamped Inductive Waveforms**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 Reverse Recovery Time