

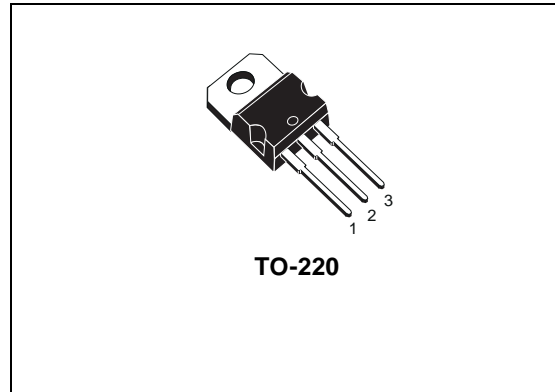


MTP3055E

N-CHANNEL 60V - 0.1Ω - 12A TO-220 STripFET™ POWER MOSFET

TYPE	V _{bss}	R _{DS(on)}	I _D
MTP3055E	60 V	< 0.15 Ω	12 A

- TYPICAL R_{DS(on)} = 0.1Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- 175°C OPERATING TEMPERATURE
- APPLICATION ORIENTED CHARACTERIZATION

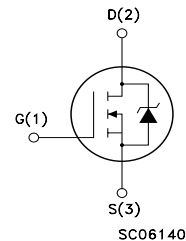


TO-220

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
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	12	A
I _{Dm}	Drain Current (pulsed) at T _C = 100°C	9	A
I _{DM} (●)	Drain Current (pulsed)	48	A
P _{TOT}	Total Dissipation at T _C = 25°C	40	W
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(●) Pulse width limited by safe operating area
First digit of the datecode being Z or K identifies silicon characterized in this datasheet

MTP3055E

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	3.75	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°C/W
Rthc-s	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 _{jmax})	12	A
E _{AS}	Single pulse Avalanche Energy (starting T _j = 25°C, I _D = I _{AR} , V _{DD} = 25 V)	50	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 = 250 µA, V _{GS} = 0	60			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating x 0.8, 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	2.9	4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V, I _D = 7 A		0.1	0.15	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{DS(on)max} , V _{GS} = 10V	12			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} = I _{D(on)} × R _{DS(on)max} , I _D = 6 A	4	6		S
C _{iss}	Input Capacitance	V _{DS} = 25 V, f = 1 MHz, V _{GS} = 0		760		pF
C _{oss}	Output Capacitance			100		pF
C _{rss}	Reverse Transfer Capacitance			30		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING RESISTIVE LOAD

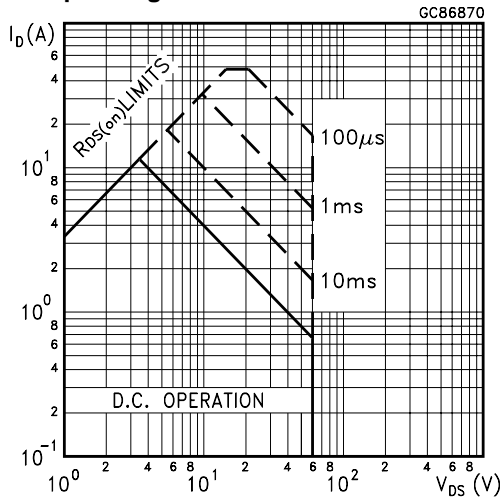
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 30\text{ V}, I_D = 7\text{ A}$ $R_G = 50\Omega, V_{GS} = 10\text{ V}$ (see test circuit)		20		ns
t_r	Rise Time			65		ns
$t_{d(off)}$	Turn-off-Delay Time			70		ns
t_f	Fall Time			35		ns
Q_g	Total Gate Charge	$I_D = 12\text{ A}, V_{GS} = 10\text{ V},$ $V_{DD} = 40\text{ V}$ (see test circuit)		15		nC
Q_{gs}	Gate-Source Charge			7		nC
Q_{gd}	Gate-Drain Charge			5		nC

SOURCE DRAIN DIODE

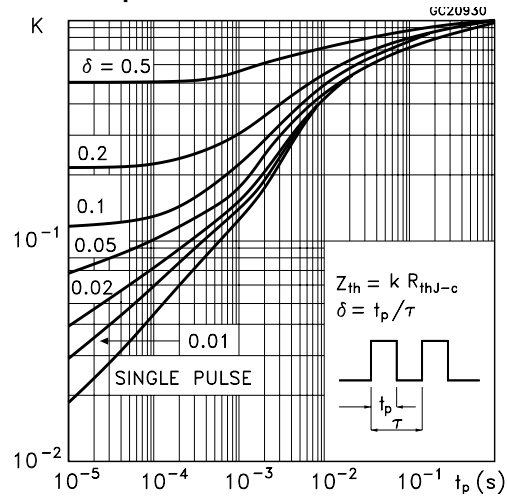
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				12	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				48	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 12\text{ A}, V_{GS} = 0$			2	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 12\text{ A}, di/dt = 100\text{ A}/\mu\text{s},$ $V_{DD} = 30\text{ V}, T_j = 150^\circ\text{C}$		65		ns
Q_{rr}	Reverse Recovery Charge			0.17		μC

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

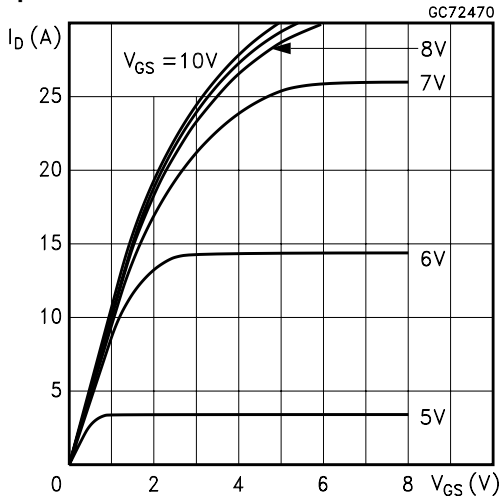
Safe Operating Area



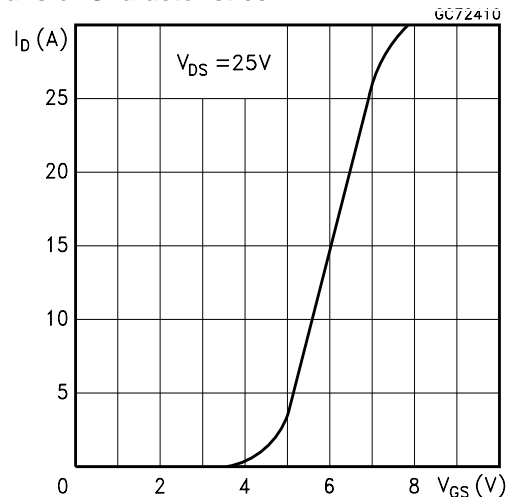
Thermal Impedance



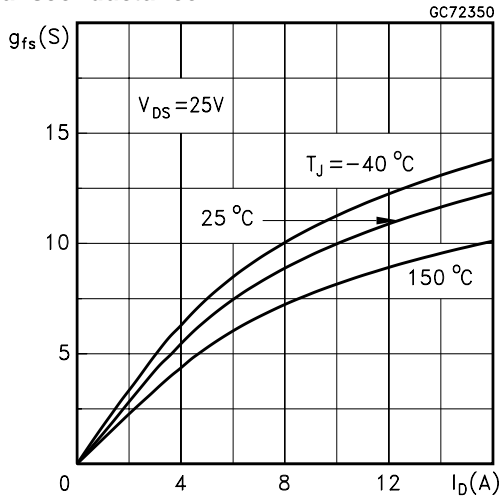
Output Characteristics



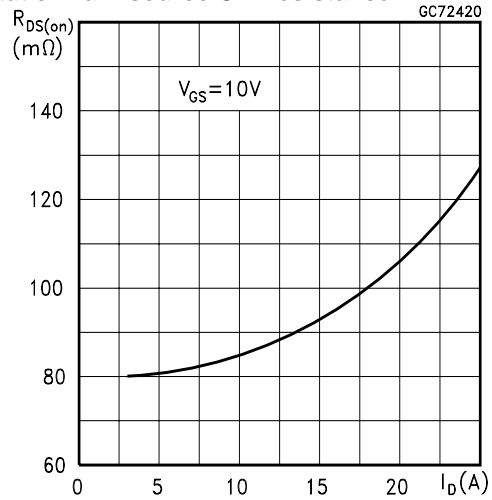
Transfer Characteristics



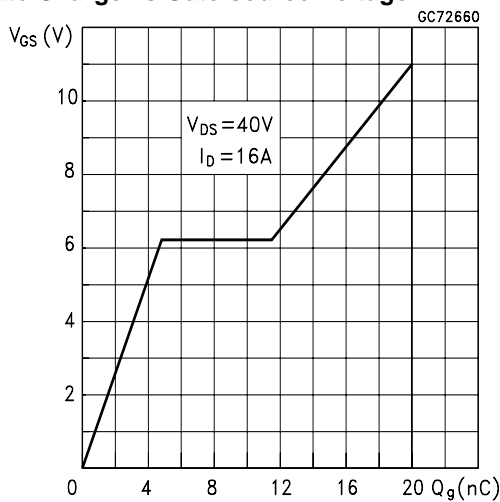
Transconductance



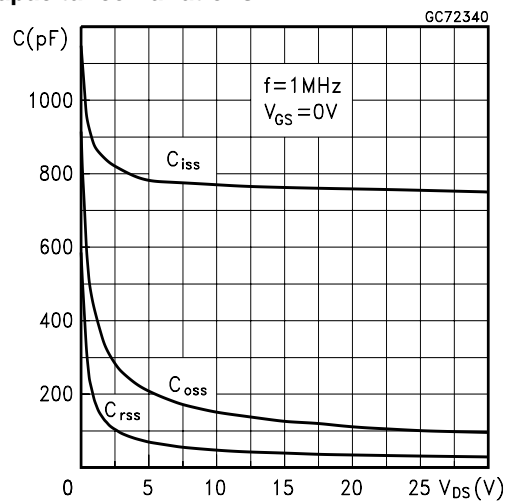
Static Drain-source On Resistance



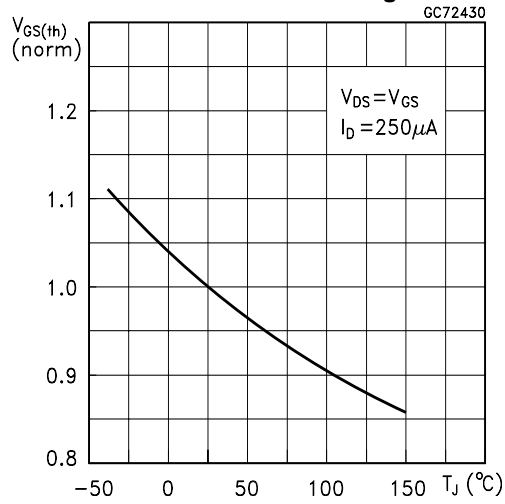
Gate Charge vs Gate-source Voltage



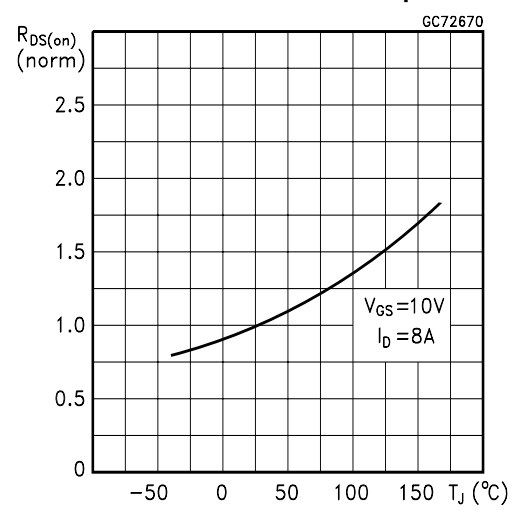
Capacitance Variations



Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

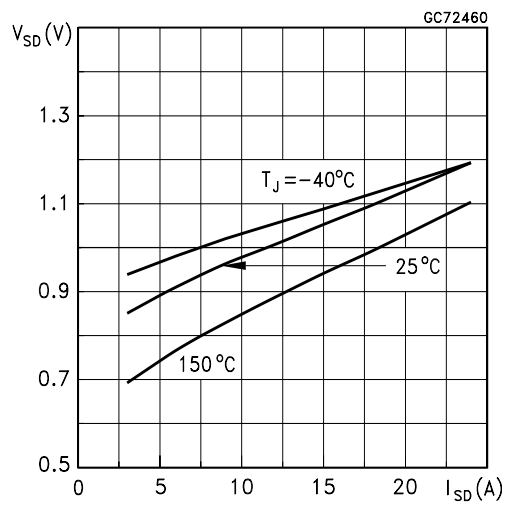


Fig. 1: Unclamped Inductive Load Test Circuit

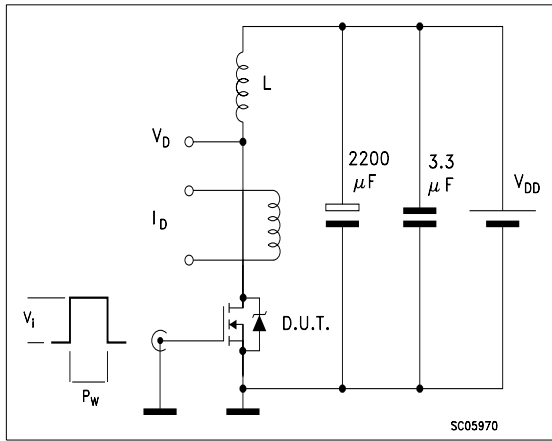


Fig. 2: Unclamped Inductive Waveform

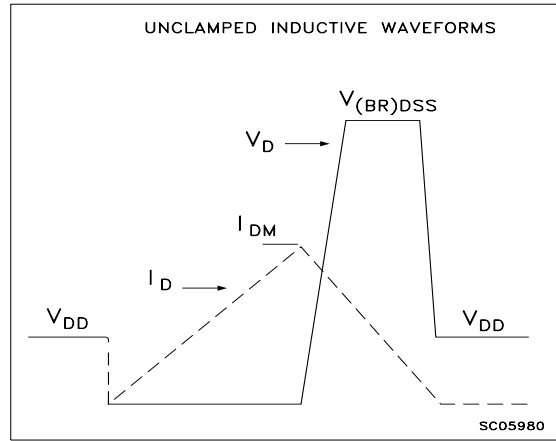


Fig. 3: Switching Times Test Circuit For Resistive Load

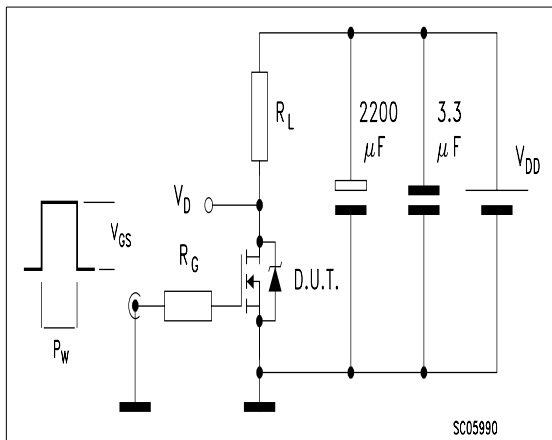


Fig. 4: Gate Charge test Circuit

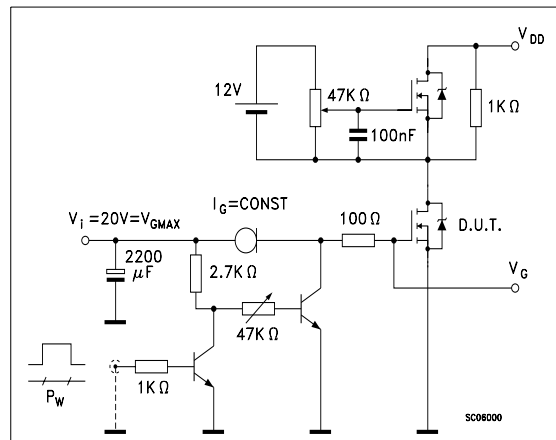
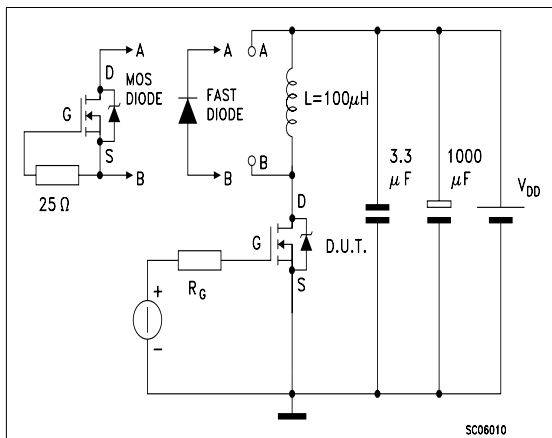
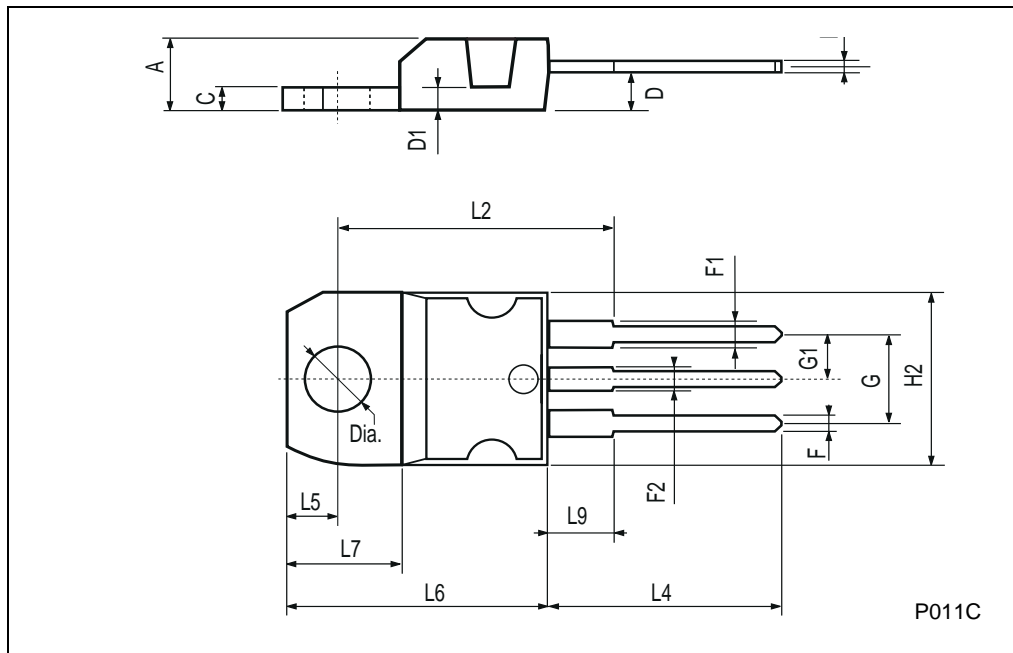


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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