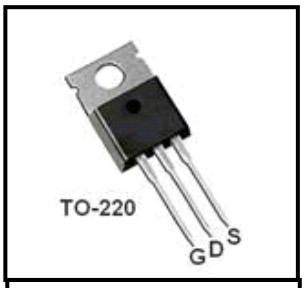
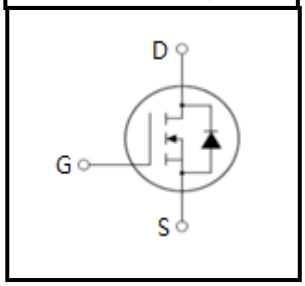
40V N-Channel MOSFET

FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability





APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Hard switched and high frequency circuits

Device Marking and Package Information

Device	Package	Marking
SR162N04T	TO-220	SR162N04T

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value	Unit
		TO-220	
Drain-Source Voltage (V_{GS} = 0V)	V_{DSS}	40	V
Continuous Drain Current V_{GS} = 10V T_C = 25ºC	I_D	162 (note5)	A
Pulsed Drain Current (note1)	I_{DM}	648	A
Gate-Source Voltage	V_{GSS}	±20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	1980	mJ
Avalanche Current (note1)	I_{AS}	95	A
Repetitive Avalanche Energy (note1)	E_{AR}	1188	mJ
Power Dissipation (T_C = 25ºC)	P_D	171	W
Peak Diode Recovery dv/dt (note1)	dv/dt	5.0	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	0.73	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	

Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	40	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V, V_{GS} = 0V, T_J = 25ºC	--	--	20	μA
		V_{DS} = 32V, V_{GS} = 0V, T_J = 125ºC	--	--	250	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V	--	--	±200	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 60A(Note4)	--	4	5	mΩ
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	3840	--	pF
Output Capacitance	C_{oss}		--	1710	--	
Reverse Transfer Capacitance	C_{rss}		--	470	--	
Total Gate Charge	Q_g	V_{DD} 20V, I_D = 162A, V_{GS} = 10V (Note4)	--	96	--	nC
Gate-Source Charge	Q_{gs}		--	19	--	
Gate-Drain Charge	Q_{gd}		--	46	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 20V, I_D =162A, R_G = 10 Ω, V_{GS} = 10V (Note4)	--	32	--	ns
Turn-on Rise Time	t_r		--	92	--	
Turn-off Delay Time	$t_{d(off)}$		--	101	--	
Turn-off Fall Time	t_f		--	69	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25 ºC	--	--	162	A
Pulsed Diode Forward Current	I_{SM}		--	--	650	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 60A, V_{GS} = 0V	--	--	1.3	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V,I_S = 162A, di_F/dt =100A /μs	--	78	--	ns
Reverse Recovery Charge	Q_{rr}		--	200	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Starting T_J = 25 ºC,L=1mH, V_{DD} 20V
3. I_{SD}≤95A,di/dt≤150A/us, VDD ≤V(BR)DSS, T_J = 175 ºC
4. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Calculated continuous current based on maximum allowable junction temperature,Package limitation current is 75A

Typical Characteristics T_J = 25ºC, unless otherwise noted

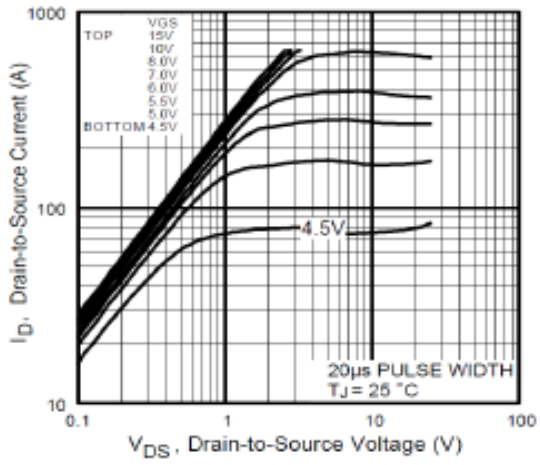


Fig 1. Typical Output Characteristics

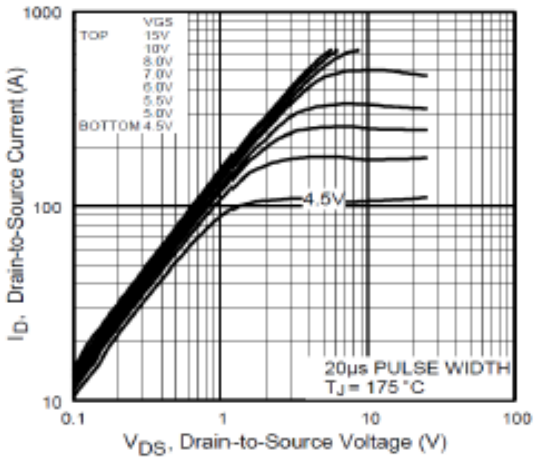


Fig 2. Typical Output Characteristics

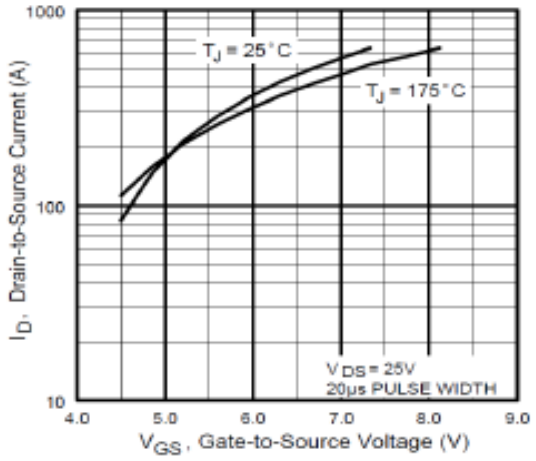


Fig 3. Typical Transfer Characteristics

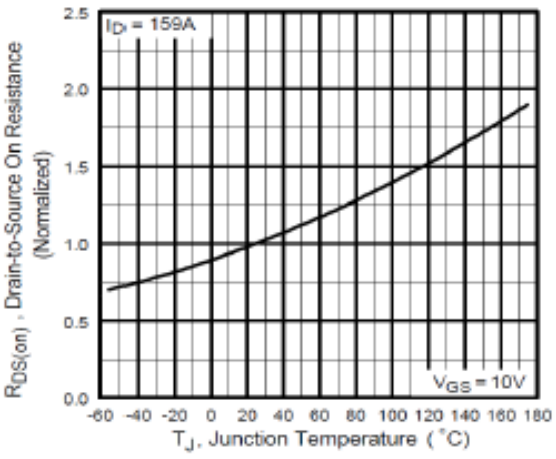


Fig 4. Normalized On-Resistance Vs. Temperature

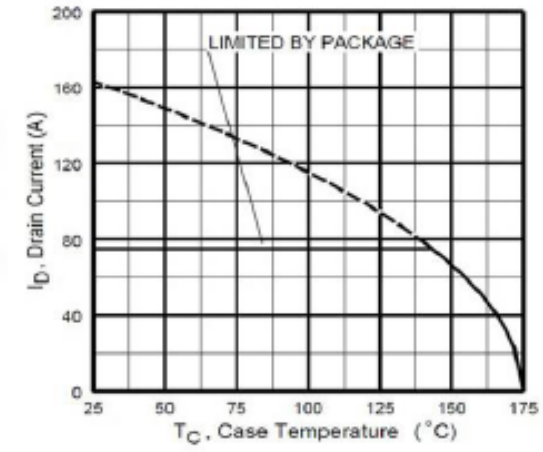


Fig 5. Maximum Drain Current Vs. Case Temperature

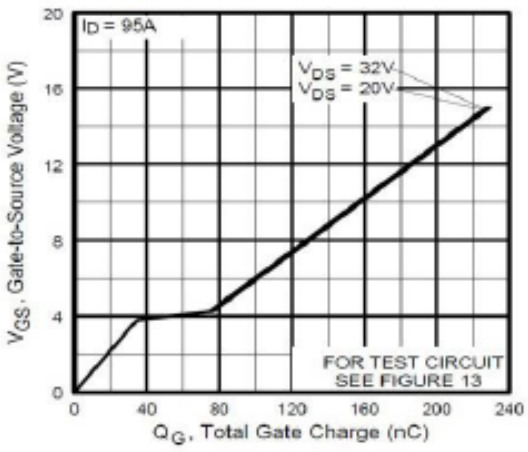


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

Typical Characteristics T_J = 25ºC, unless otherwise noted

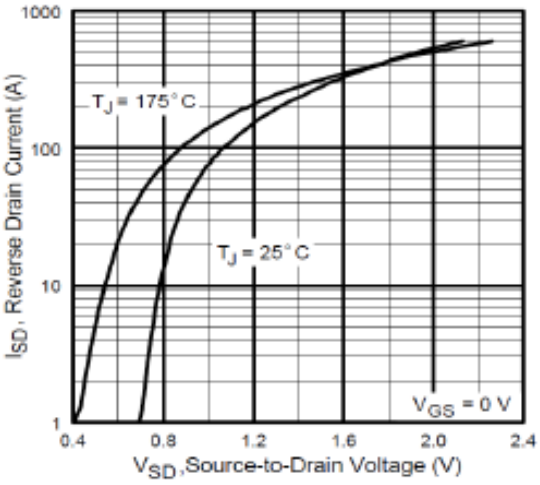


Fig 7. Typical Source-Drain Diode Forward Voltage

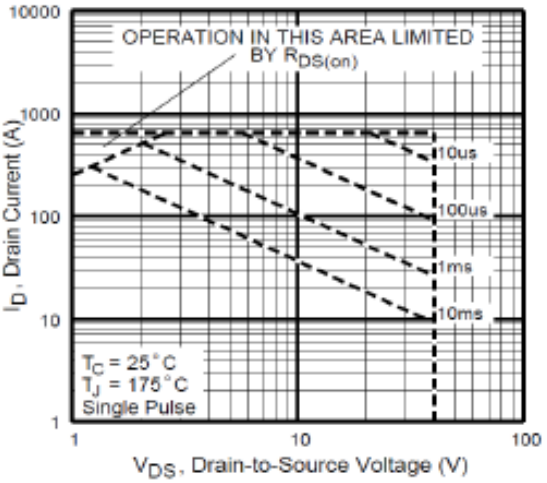


Fig 8. Maximum Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveform

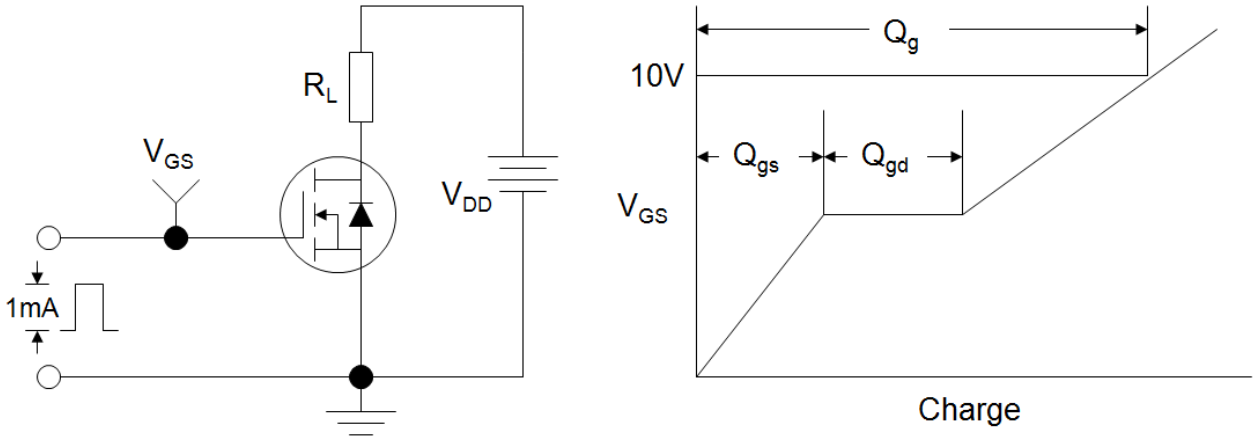


Figure B：Resistive Switching Test Circuit and Waveform

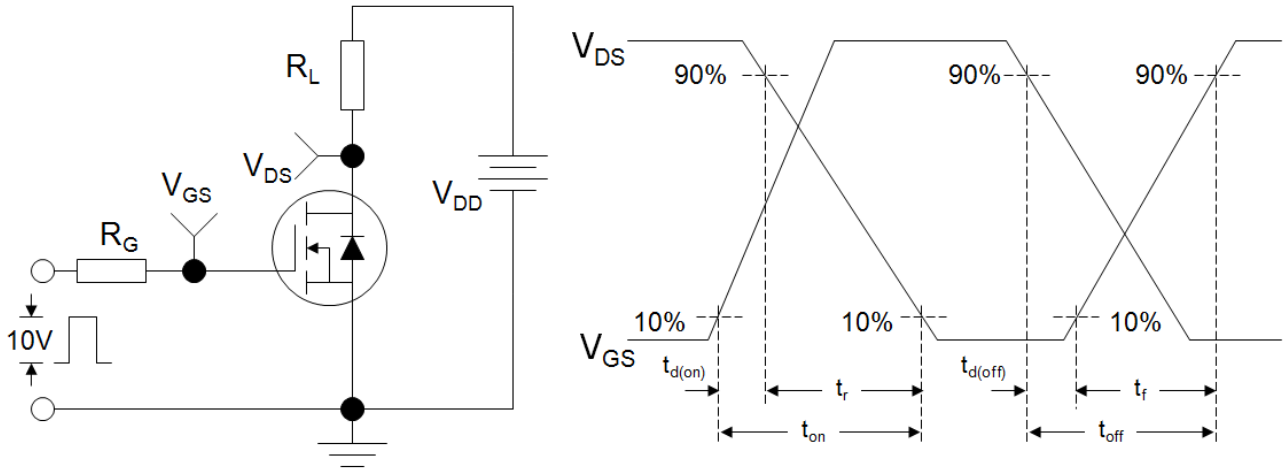
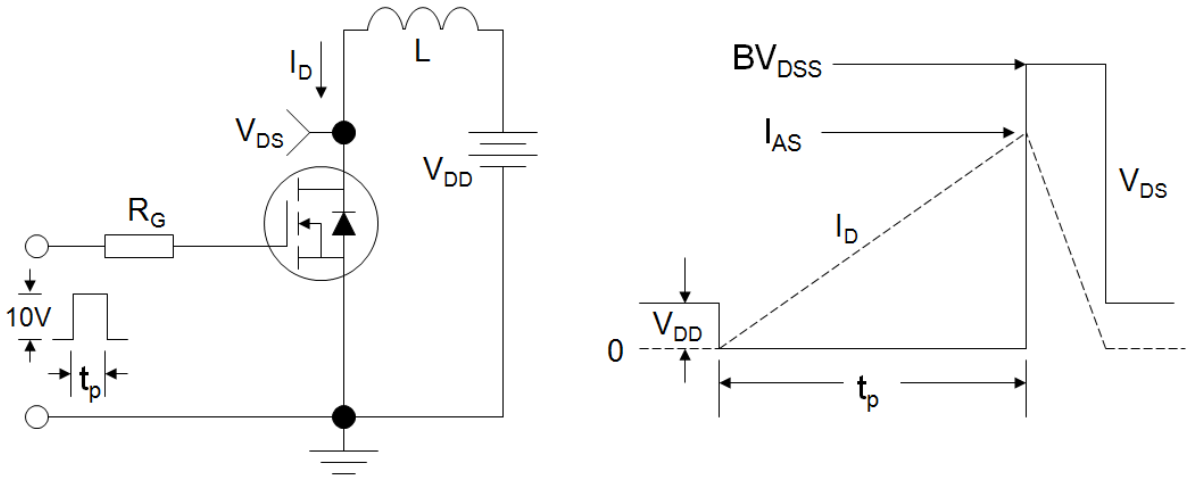
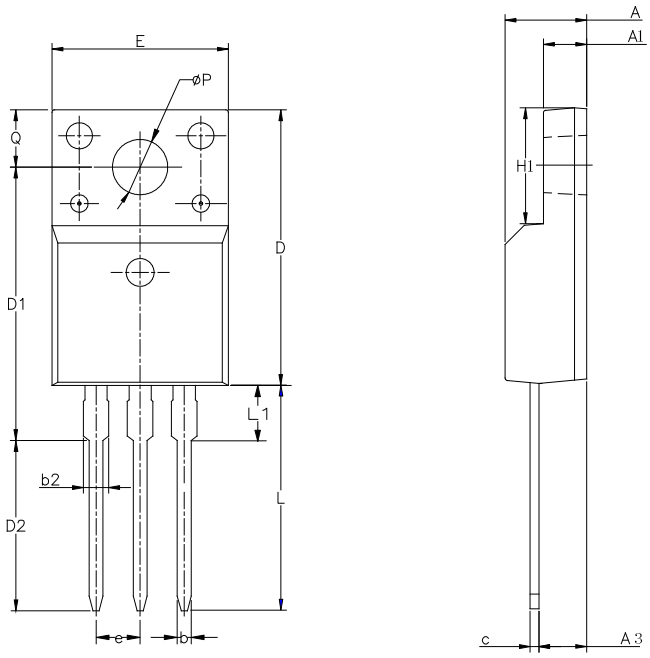


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



TO-220



SYMBOL	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e		2.54BCS	
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	/	/	3.50
øP	3.00	3.18	3.40
Q	3.05	3.30	3.55