

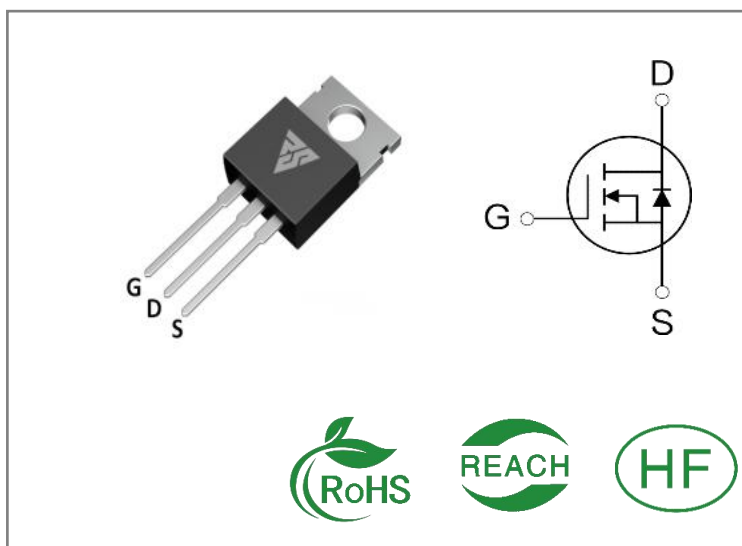
ID	$R_{DS(ON)}$ (Typ)	VDSS
120A	3.6mΩ	40V

Applications:

- Load Switch
- PWM Applications
- Power Managment

Features:

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


Ordering Information

Part Number	Package	Marking	Packing	Qty.
RS40N120T	T0-220	RS40N120T	Tube	50 PCS

Absolute Maximun Ratings $T_c = 25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	RS40N120T	Units
VDSS	Drain-to-Source Voltage	40	V
ID	Continuous Drain Current $T_C = 25^{\circ}\text{C}$	120	A
	Continuous Drain Current $T_C = 100^{\circ}\text{C}$	79	
IDM	Pulsed Drain Current*	460	
PD	Power Dissipation	109	W
VGS	Gate- to- Source Voltage	± 20	V
EAS	Single Pulse Avalanche Engergy $L = 0.5\text{mH}$, $V_{DD} = 20\text{V}$, $V_G = 10\text{V}$, $T_j = 25^{\circ}\text{C}$	162	mJ
TL TPKG	Maximum Temperature for Soldering	300 260	$^{\circ}\text{C}$
	Leads at 0.063in(1.6mm)from Case for 10 seconds Package Body for 10 seconds		
TJ and TSTG	Operating Junction and Storage Temperature Range	-55 to 175	

* Drain Current Limited by Maximum Junction Temperature

Caution: Stresses greater than those listed in the“ Absolute Maximum Ratings” Table may cause permanent damage to the device.

Thermal Resistance

Symbol	Parameter	RS40N120T	Units	Test Conditions
R θ JC	Junction-to-Case	1.4	°C / W	Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of + 150 °C
R θ JA	Junction-to-Ambient	20		1 cubic foot chamber, free air.

OFF Characteristics TJ= 25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BVDSS	Drain- to- source Breakdown Voltage	40	--	--	V	VGS=0V, ID=250μA
IDSS	Drain- to- Source Leakage Current	--	--	1	μA	VDS=40V, VGS=0V
IGSS	Gate- to- Source Forward Leakage	--	--	100	nA	VGS=20V , VDS=0V
	Gate- to- Source Reverse Leakage	--	--	-100		VGS=-20V , VDS=0 V

ON Characteristics TJ=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
RDS(on)	Static Drain- to- Source On-Resistance	--	3.6	4.5	mΩ	VGS=10V, ID=30A
		--	5.4	7.6	mΩ	VGS=4.5V, ID=20A
VGS(TH)	Gate Threshold Voltage	1.0	1.5	2.5	V	VGS=VDS, ID=250μA

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
td(ON)	Turn- on Delay Time	--	12	--	nS	VDS=20V ID=30A RG=3Ω VGS=10V
trise	Rise Time	--	18	--		
td(OFF)	Turn- OFF Delay Time	--	38	--		
tfall	Fall Time	--	16	--		

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ciss	Input Capacitance (10V)	--	5601	--	pF	VGS= 0V VDS=20V f=1.0MHz
Coss	Output Capacitance (4.5V)	--	415	--		
Crss	Reverse Transfer Capacitance	--	339	--		
Qg	Total Gate Charge	--	66	--	nC	VDS=20V ID=30A VGS=10V
	Total Gate Charge *	--	49	--		
Qgs	Gate- to- Source Charge	--	12.8	--		
Qgd	Gate-to-Drain(" Miller") Charge	--	215	--		

Source- Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
IS	Continuous Source Current	--	--	120	A	Integral pn- diode in MOSFET
ISM	Maximum Pulsed Current	--	--	480	A	
VSD	Diode Forward Voltage	--	--	1.2	V	IS=15A,VGS=0V
trr	Reverse Recovery Time	--	22.3	--	nS	VGS=0V IS=20A di/dt=100A/μs
Qrr	Reverse Recovery Charge	--	11.2	--	nC	

Notes:

- * 1. Repetitive rating, pulse width limited by maximum junction temperature.
 * 2. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Feature Curve

Figure1: Output Characteristics

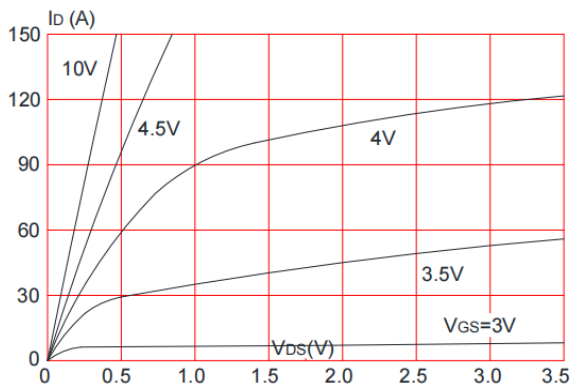


Figure 2: Typical Transfer Characteristics

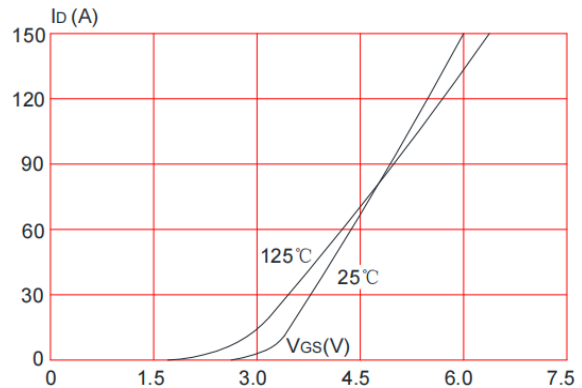


Figure 3: On-resistance vs. Drain Current

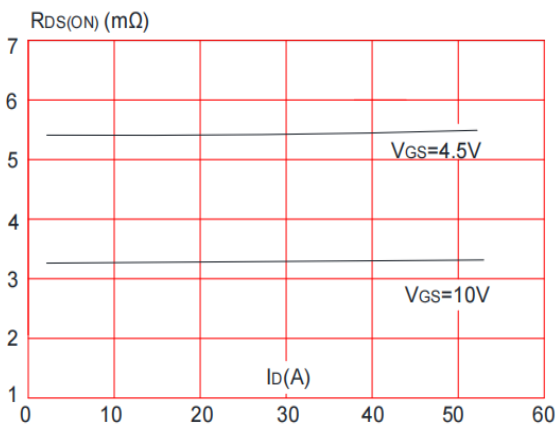


Figure 4: Body Diode Characteristics

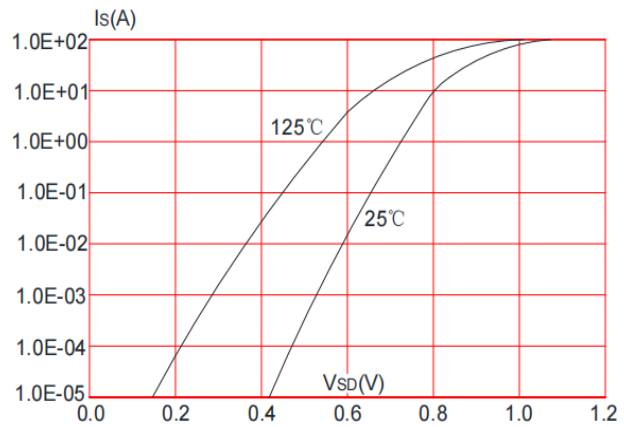


Figure 5: Gate Charge Characteristics

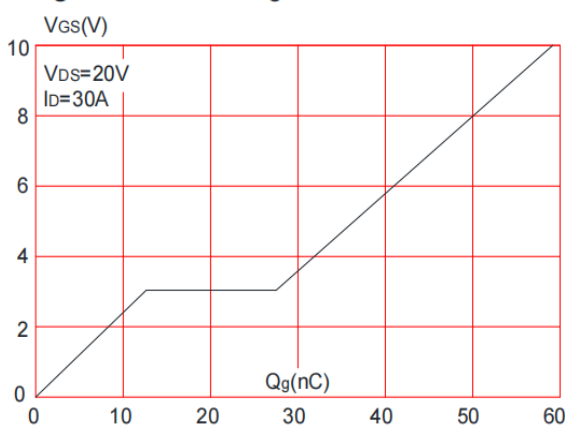


Figure 6: Capacitance Characteristics

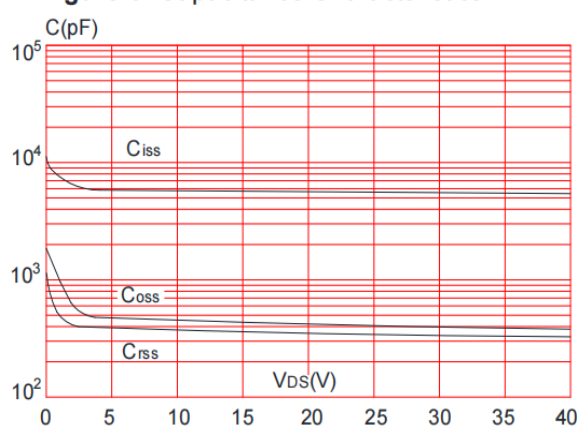


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

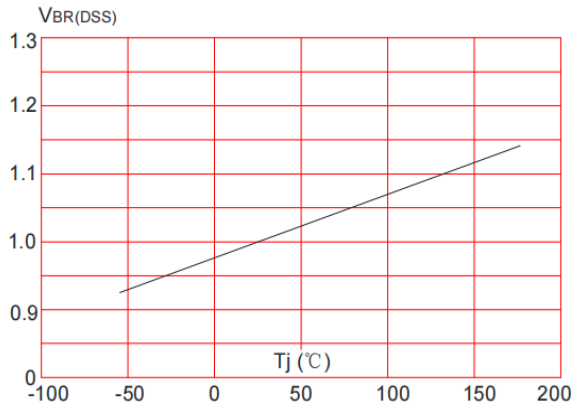


Figure 8: Normalized on Resistance vs. Junction Temperature

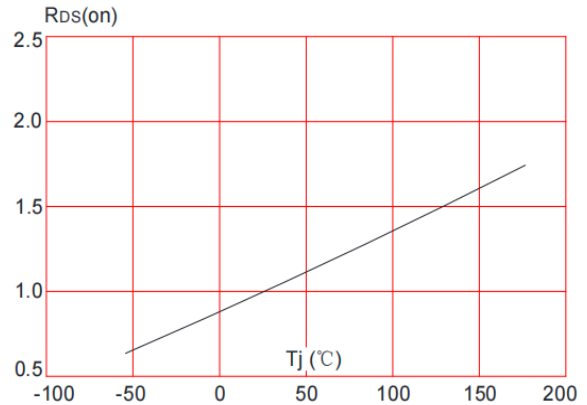


Figure 9: Maximum Safe Operating Area

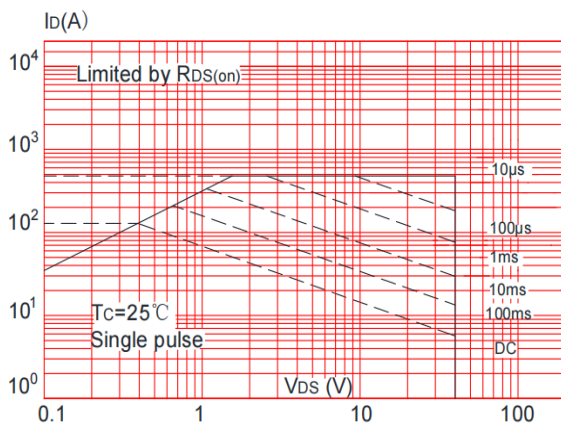


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

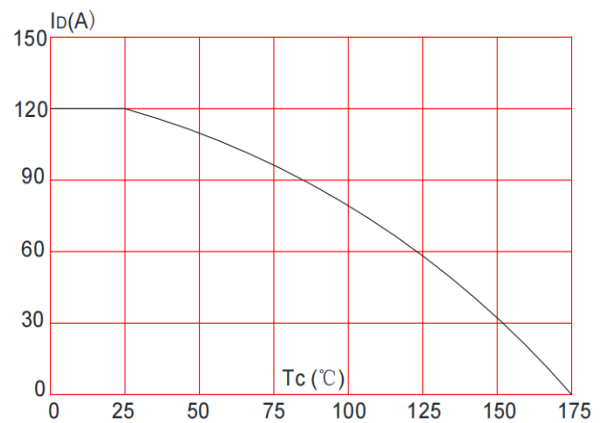
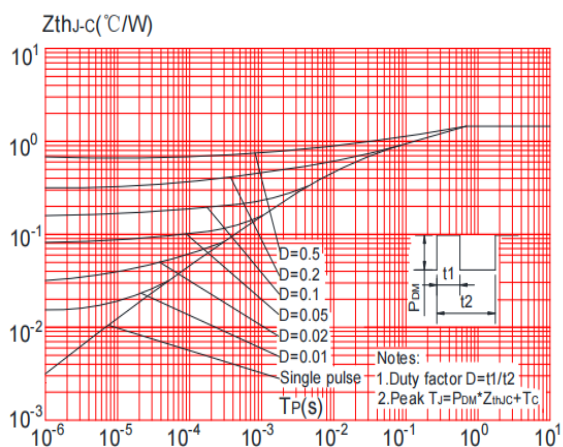


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test ircuits and Waveforms

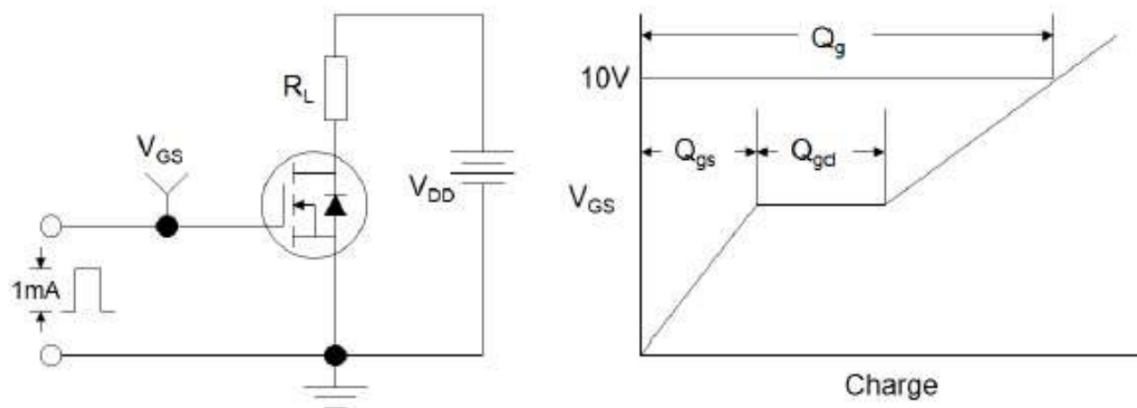


Figure1:Gate Charge Test Circuit & Waveform

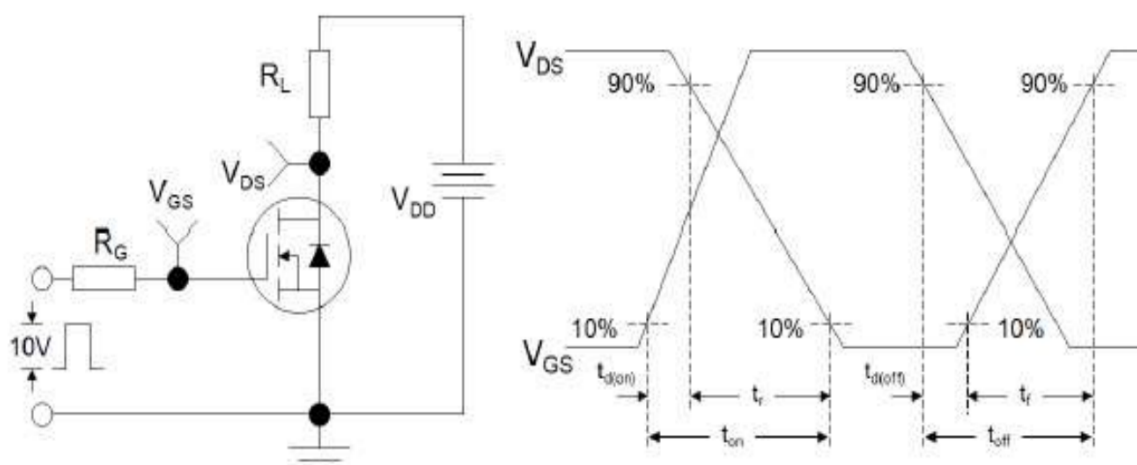


Figure 2: Resistive Switching Test Circuit & Waveforms

Test ircuits and Waveforms

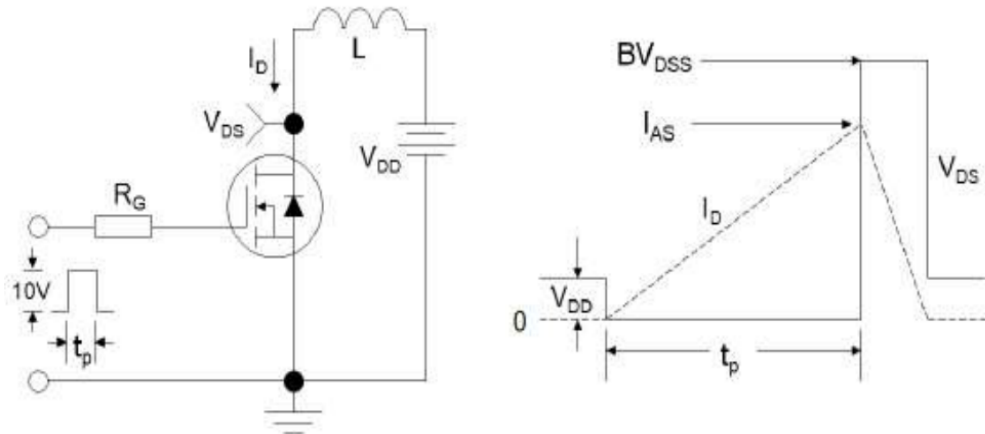
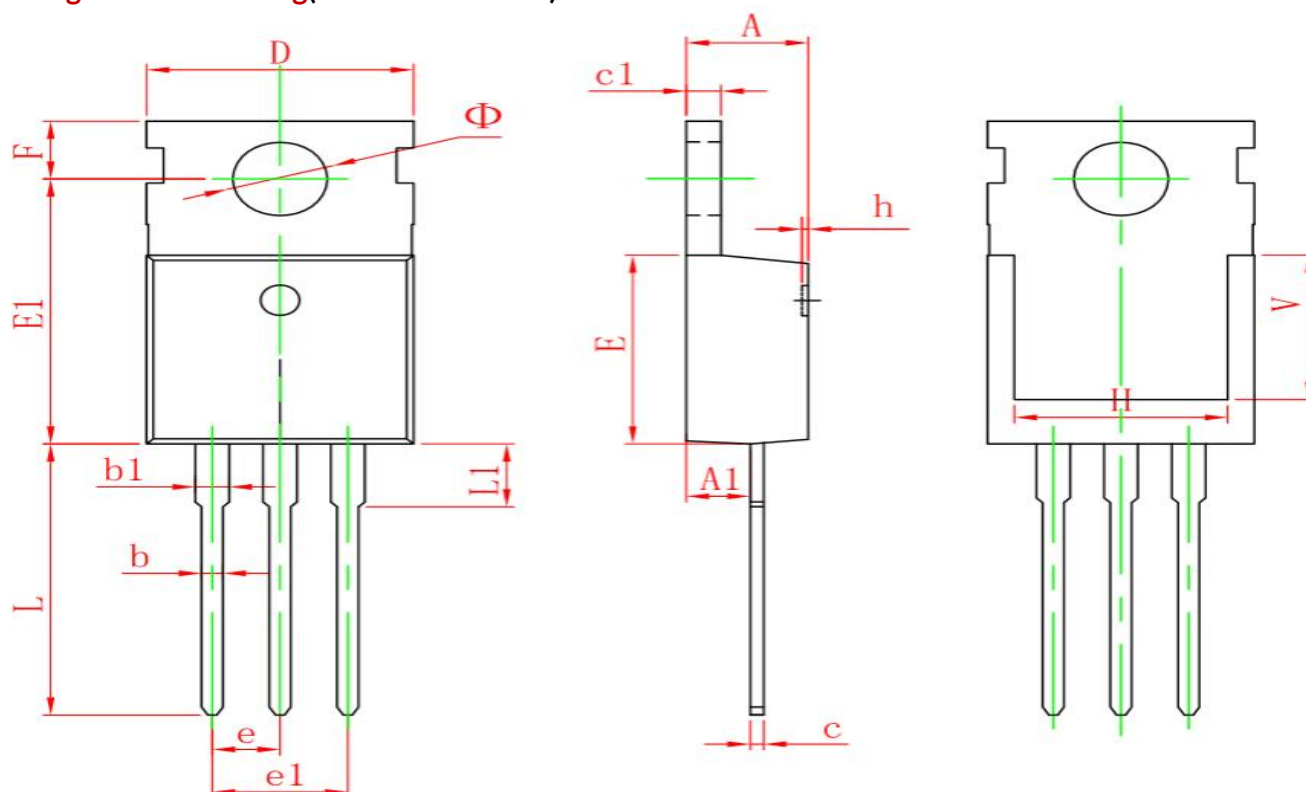


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package outline drawing(TO-220 Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
Φ	3.400	3.800	0.134	0.150

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