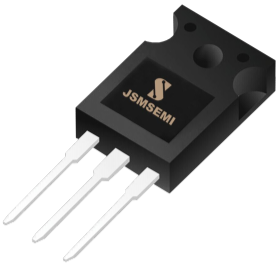
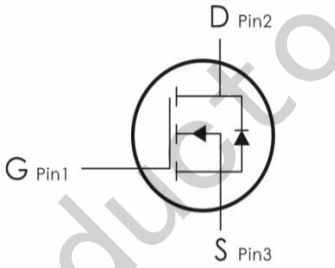
FEATURES

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



APPLICATIONS

- DC-DC Converters
- DC-AC Inverters for UPS
- SMPS and Motor controls



Device Marking and Package Information		
Device	**Package**	**Marking**
STW40NF20	TO-247	STW40NF20

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted			
Parameter	**Symbol**	**Value**	**Unit**
Drain-Source Voltage	V_{DSS}	220	V
Continuous Drain Current	I_D	40	A
Pulsed Drain Current (note1)	I_{DM}	160	A
Gate-Source Voltage	V_{GSS}	±20	V
Single Pulse Avalanche Energy (note1)	E_{AS}	191	mJ
Avalanche Current (note1)	I_{AS}	31	A
Repetitive Avalanche Energy (note1)	E_{AR}	124	mJ
Power Dissipation (T_C = 25ºC)	P_D	350	W
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}	1.2	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	

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	220	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 220V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 220V, V_{GS} = 0V, TJ = 125ºC	--	--	100	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 20A	--	0.04	0.05	Ω
Forward Transconductance (Note4)	gfs	VDS = 25V, ID = 20A	--	16	--	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	2800	--	pF
Output Capacitance	C_{oss}		--	355	--	
Reverse Transfer Capacitance	C_{rss}		--	101	--	
Total Gate Charge	Q_g	V_{DD} = 160V, I_D = 40A,	--	154		nC
Gate-Source Charge	Q_{gs}		--	13	--	
Gate-Drain Charge	Q_{gd}		--	58	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 160V, I_D = 40A, VGS =15V.RG = 25Ω	--	46	--	ns
Turn-on Rise Time	t_r		--	54	--	
Turn-off Delay Time	$t_{d(off)}$		--	360	--	
Turn-off Fall Time	t_f		--	96	--	
Drain-Source Body Diode Characteristics						
Continuous Source Current	I_{SD}	Integral PN-diode in MOSFET	--	--	40	A
Pulsed Source Current	I_{SM}		--	--	160	
Body Forward Voltage	V_{SD}	I_S = 20A, V_{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V,I_F = 10A, di_F/dt =100A /μs	--	152	--	ns
Reverse Recovery Charge	Q_{rr}		--	1	--	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 1mH, V_{DD} = 30V, R_G = 25 Ω, Starting T_J = 25 ºC
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

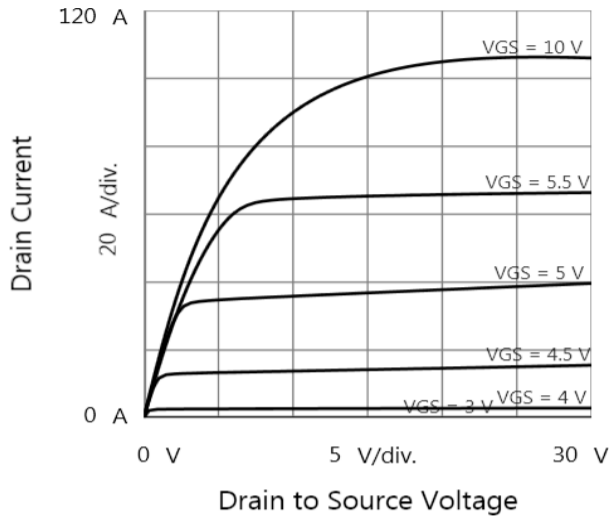


Figure 2. Transfer Characteristics

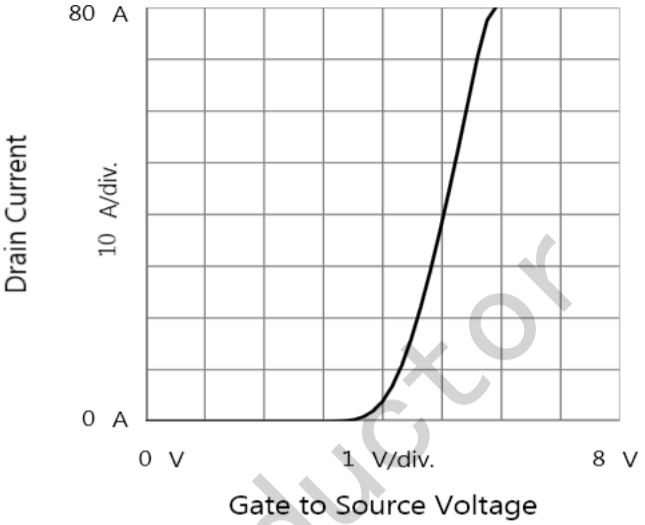


Figure 3. Drain to Source Resistance vs. Drain Current

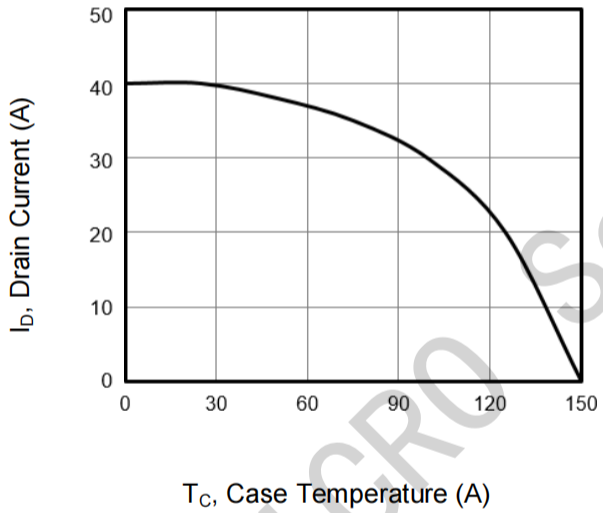


Figure 4. BV_{DSS} Variation vs. Temperature

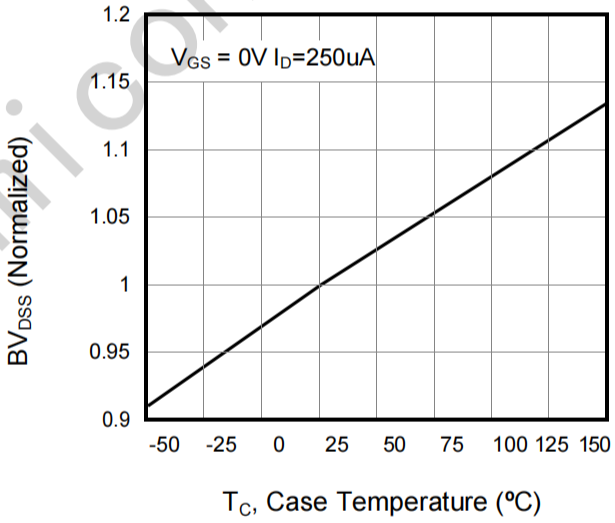


Figure 5. Drain to Source Voltage vs. Gate to Source Voltage

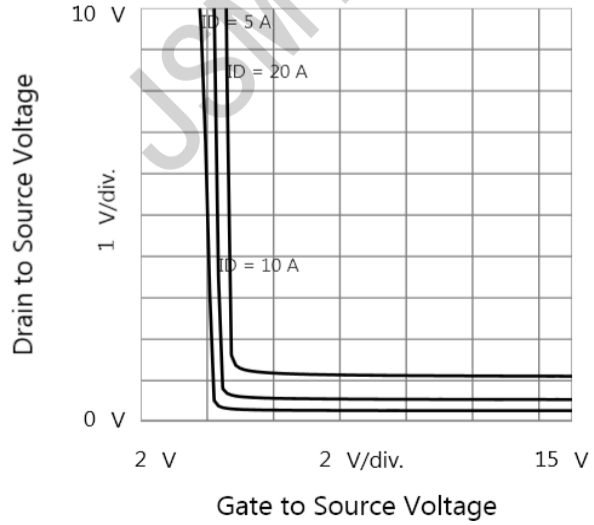
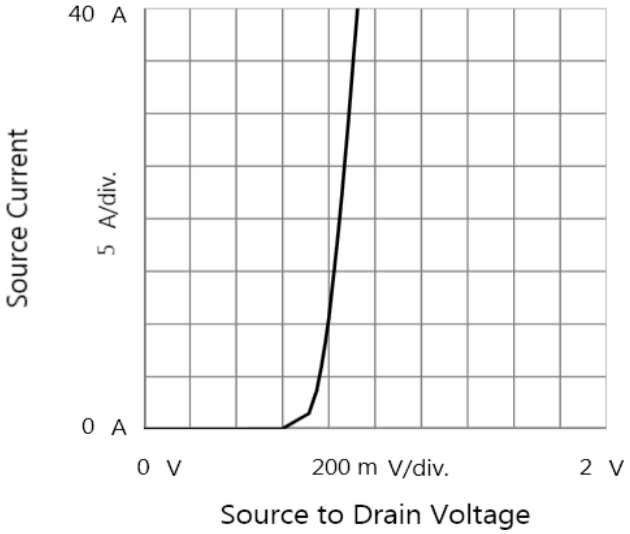


Figure 6. Body Diode Forward Characteristics



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Capacitance

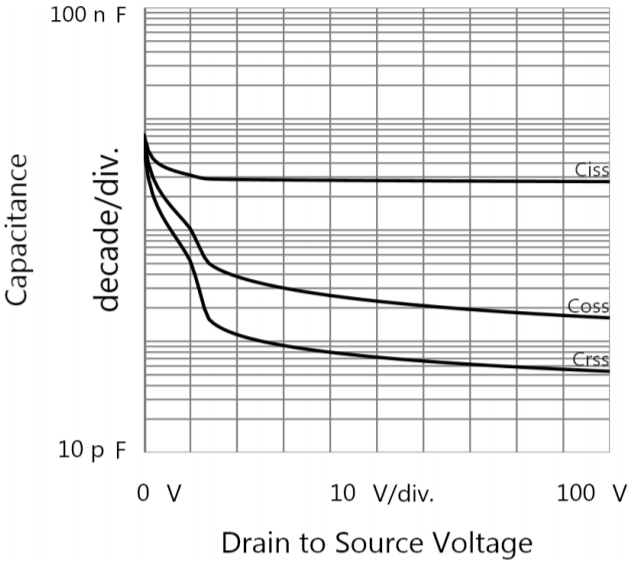


Figure 8. Gate Charge

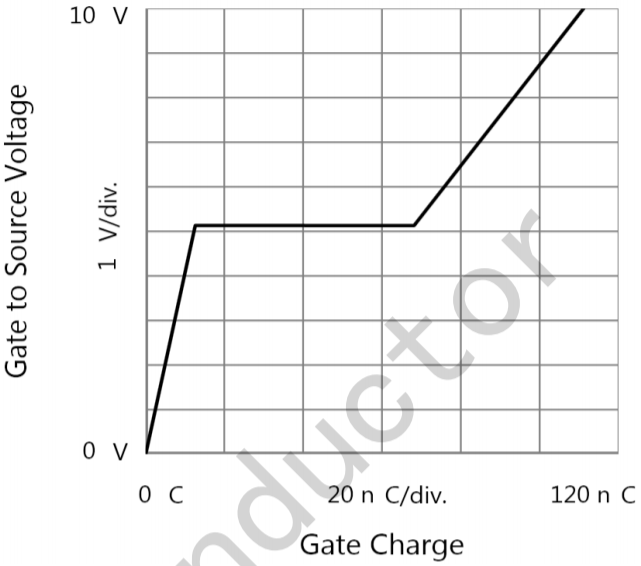


Figure 9. Transient Thermal Impedance

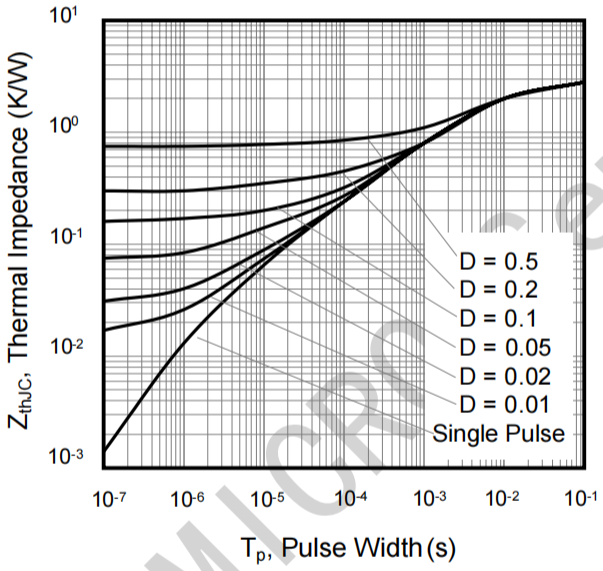


Figure A：Gate Charge Test Circuit and Waveform

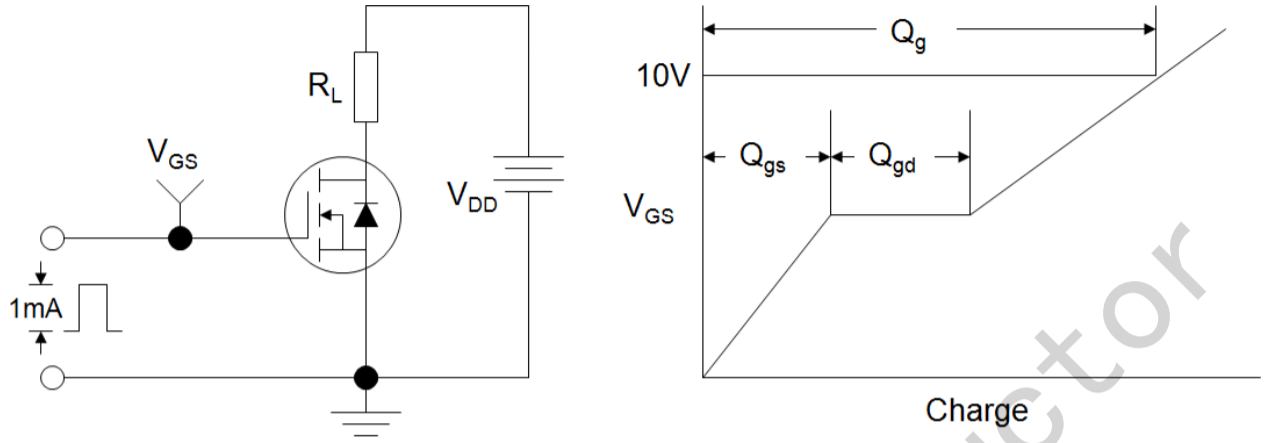


Figure B：Resistive Switching Test Circuit and Waveform

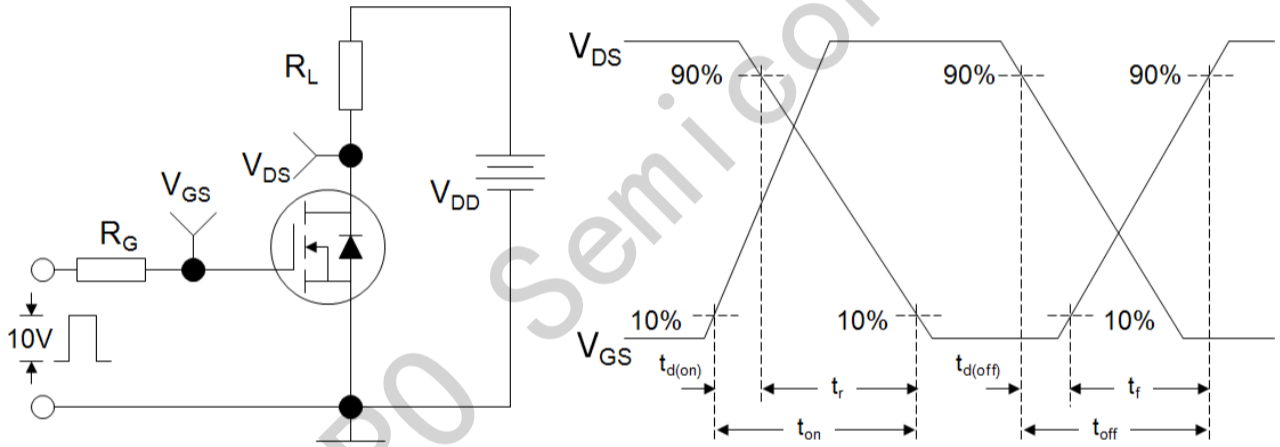
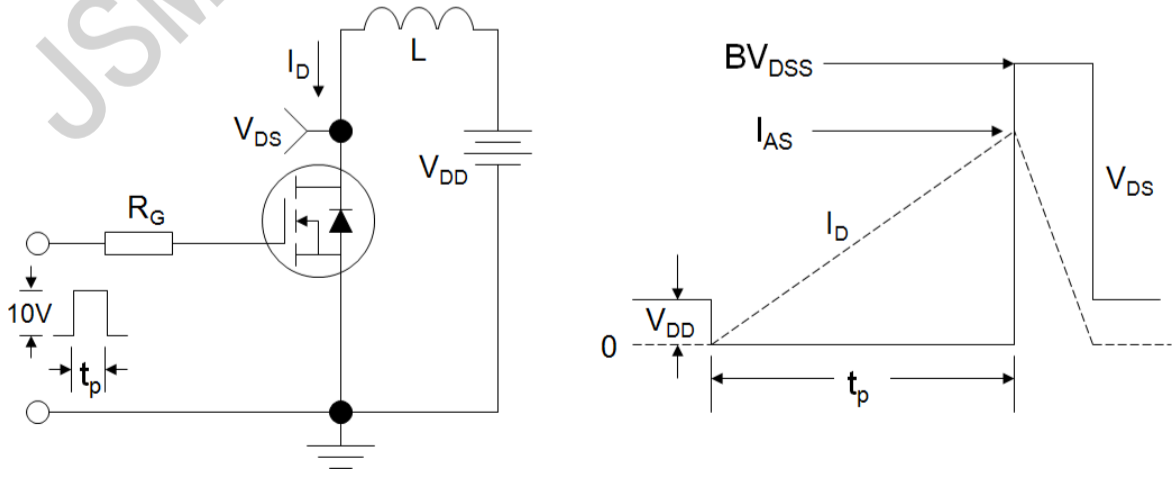


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



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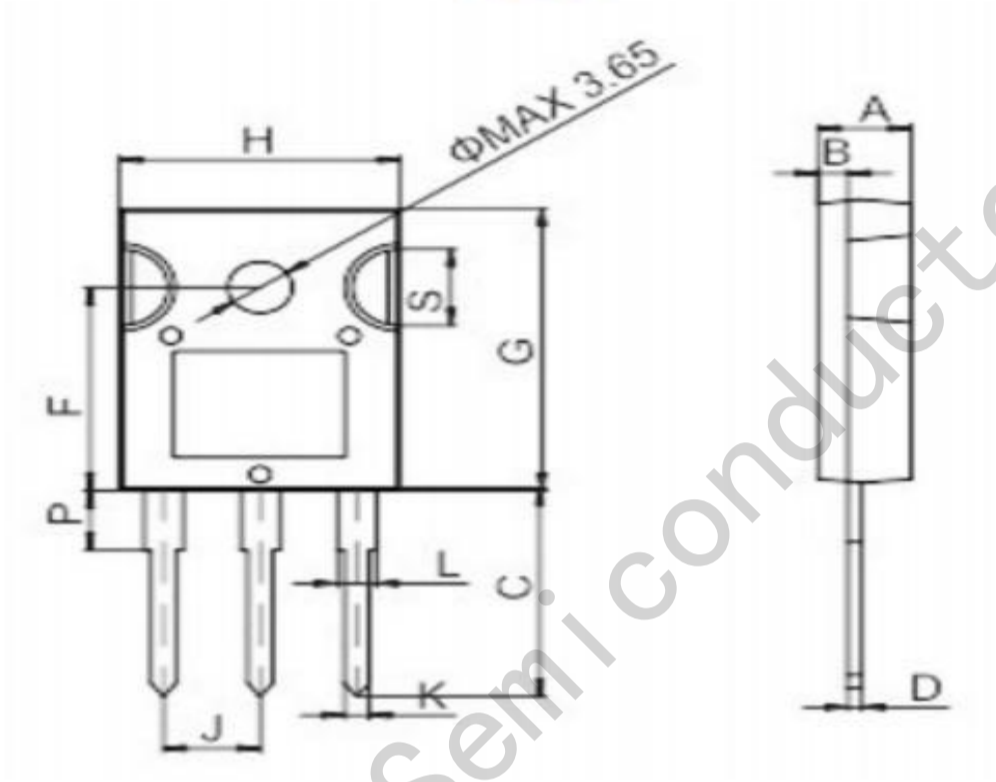

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.9		5.4	0.193		0.213
B	1.6		2.0	0.063		0.079
C	14.35		15.4	0.565		0.606
D	0.5		0.8	0.020		0.031
F	14.4		15.1	0.567		0.594
G	19.7		20.6	0.775		0.811
H	15.4		16.2	0.606		0.638
J	5.3		5.6	0.209		0.220
K	1.3		1.5	0.051		0.059
L	2.8		3.3	0.110		0.130
P	3.7		4.2	0.146		0.165
S	5.35		5.65	0.211		0.222