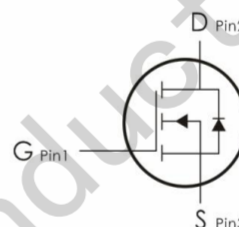
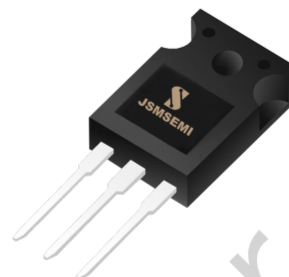


FEATURES

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

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



Device Marking and Package Information		
Device	Package	Marking
FQA65N20	TO-247	FQA65N20

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted			
Parameter	Symbol	Value	Unit
		TO-247	
Drain-Source Voltage	V_{DS}	200	V
Continuous Drain Current	I_D	60	A
Pulsed Drain Current (note2)	I_{DM}	260	A
Gate-Source Voltage	V_{GS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	780	mJ
Avalanche Current (note1)	I_{AR}	39.5	V/ns
Repetitive Avalanche Energy (note1)	E_{AR}	468	mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	450	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

Thermal Resistance			
Parameter	Symbol	Value	Unit
		TO-247	
Thermal Resistance, Junction-to-Case	R_{thJC}	0.5	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	45	

Specifications $T_J = 25^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_{\text{D}} = 250\mu\text{A}$	200	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 200\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 25^{\circ}\text{C}$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = +20\text{V}, V_{\text{DS}} = 0\text{V}$	--	--	100	nA
		$V_{\text{GS}} = -20\text{V}, V_{\text{DS}} = 0\text{V}$	--	--	-100	
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_{\text{D}} = 250\mu\text{A}$	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, I_{\text{D}} = 25\text{A}$	--	30	48	m Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V},$ $V_{\text{DS}} = 25\text{V},$ $f = 1.0\text{MHz}$	--	3538	--	pF
Output Capacitance	C_{oss}		--	657	--	
Reverse Transfer Capacitance	C_{rss}		--	280	--	
Total Gate Charge	Q_{g}	$V_{\text{DD}} = 160\text{V}, I_{\text{D}} = 25\text{A},$ $V_{\text{GS}} = 0 \text{ to } 10\text{V}$	--	244	--	nC
Gate-Source Charge	Q_{gs}		--	16	--	
Gate-Drain Charge	Q_{gd}		--	144	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 100\text{V}, I_{\text{D}} = 25\text{A},$ $V_{\text{GS}} = 10\text{V } R_{\text{G}} = 25 \Omega$	--	53	--	ns
Turn-on Rise Time	t_{r}		--	65	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	689	--	
Turn-off Fall Time	t_{f}		--	230	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_{S}	$T_{\text{C}} = 25^{\circ}\text{C}$	--	--	65	A
Pulsed Diode Forward Current	I_{SM}		--	--	260	
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}\text{C}, I_{\text{SD}} = 25\text{A}, V_{\text{GS}} = 0\text{V}$	--	--	1.5	V
Reverse Recovery Time	t_{rr}	$V_{\text{GS}} = 0\text{V}, I_{\text{S}} = 25\text{A},$ $di_{\text{F}}/dt = 100\text{A}/\mu\text{s}$	--	208	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.04	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 30A, V_{DD} = 30V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

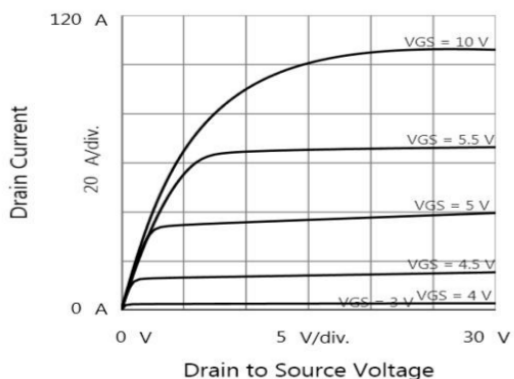


Figure 2. Transfer Characteristics

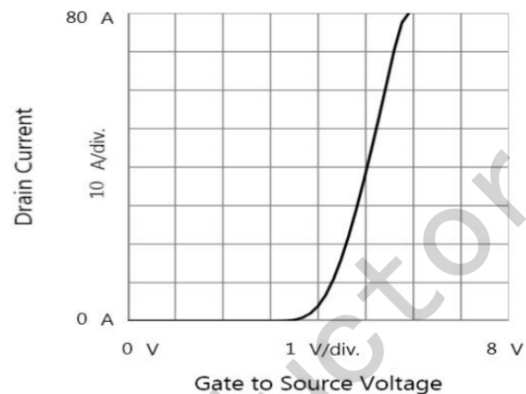


Figure 3. Maximum Continuous Drain Current vs Case Temperature

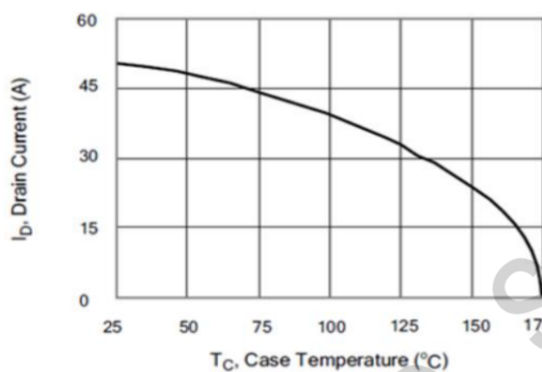


Figure 4. Drain to Source Voltage vs. Gate to Source Voltage

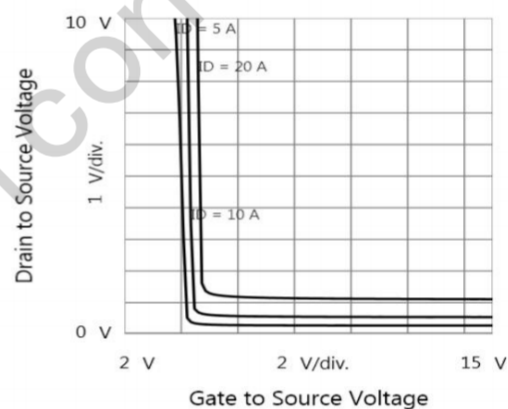


Figure 5. Typical Breakdown Voltage vs Junction Temperature

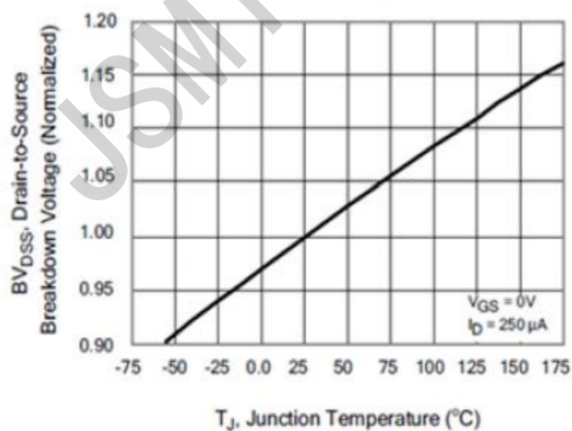
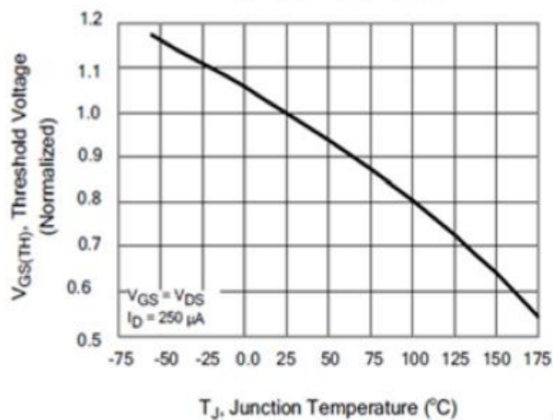


Figure 6. Typical Threshold Voltage vs Junction Temperature



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Capacitance

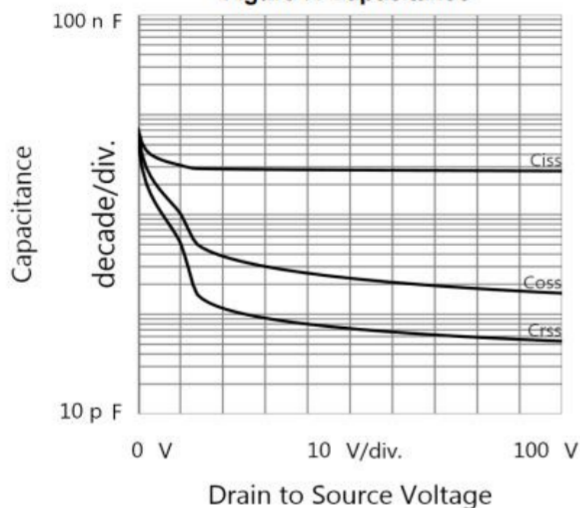
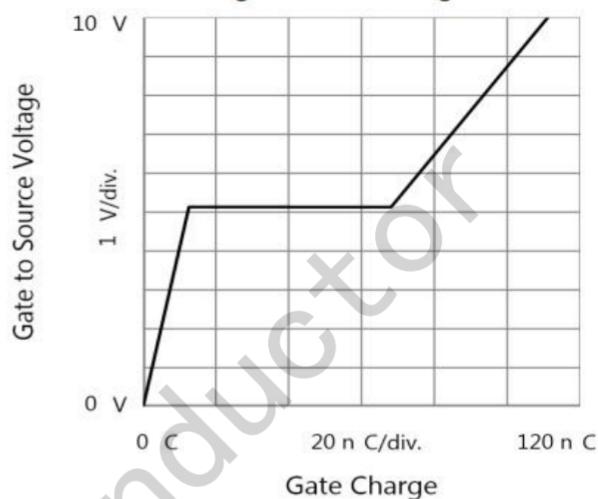
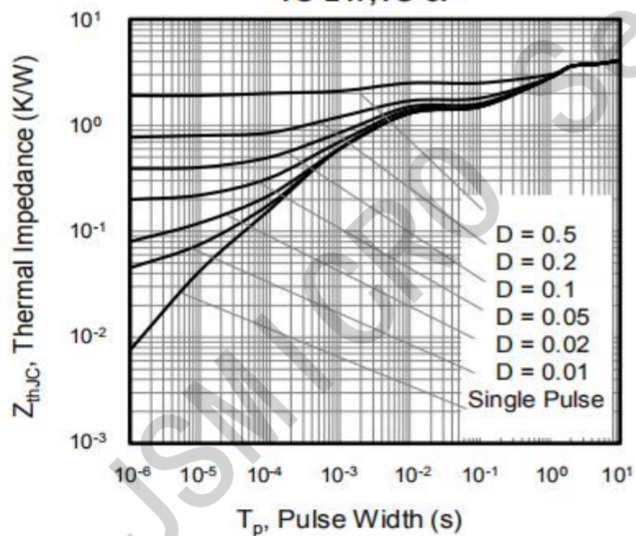


Figure 8. Gate Charge



**Figure 9. Transient Thermal Impedance
TO-247, TO-3P**



**Figure 10. Maximum Forward Bias Safe
Operating Area**

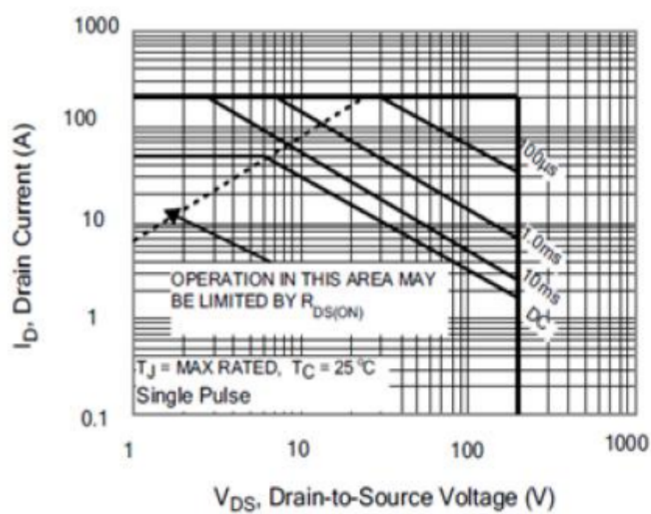


Figure A: Gate Charge Test Circuit and Waveform

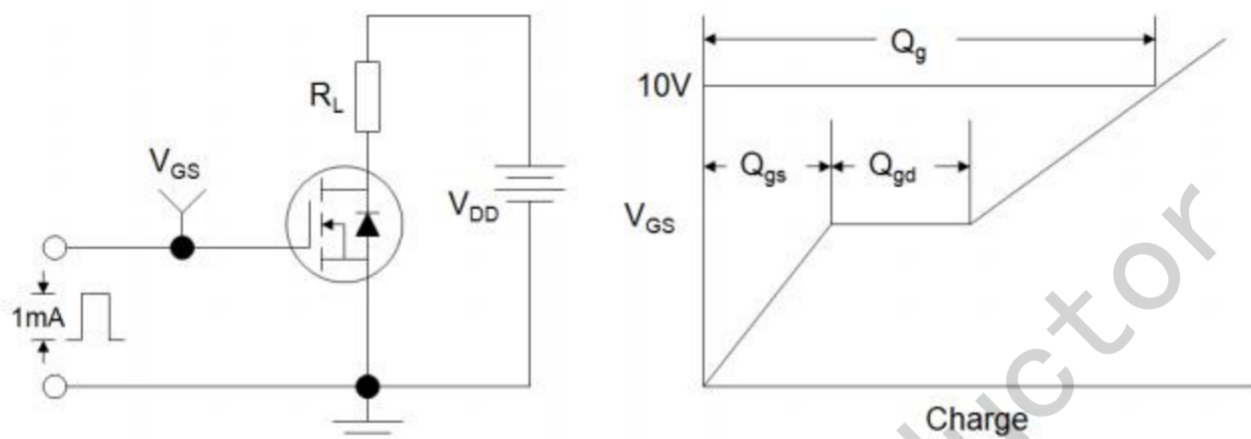


Figure B: Resistive Switching Test Circuit and Waveform

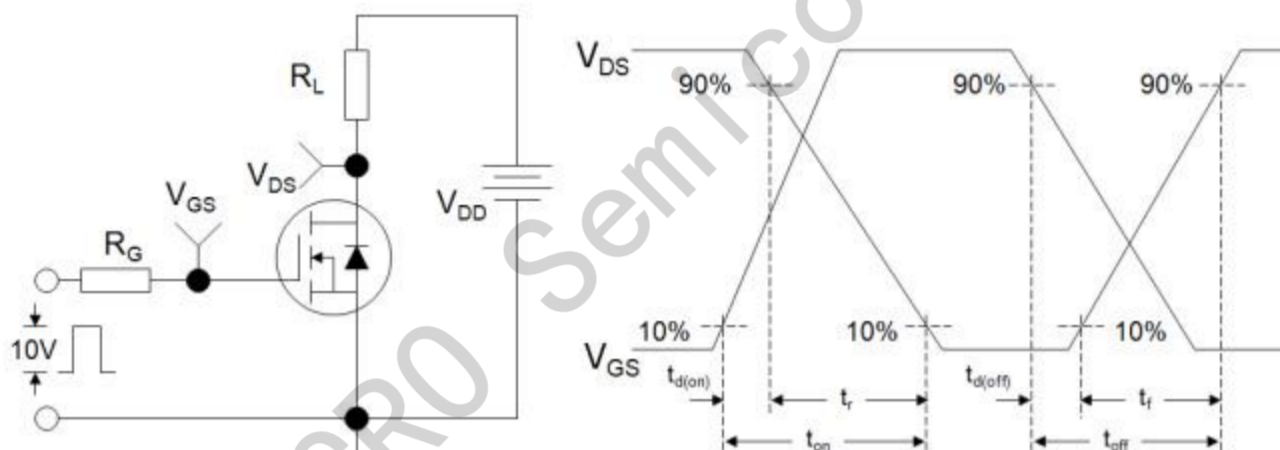
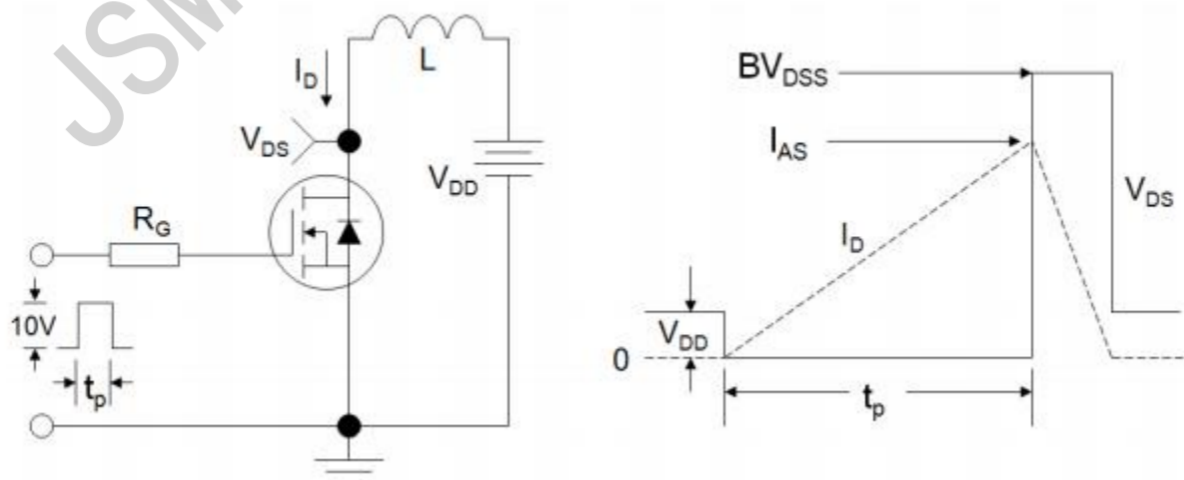
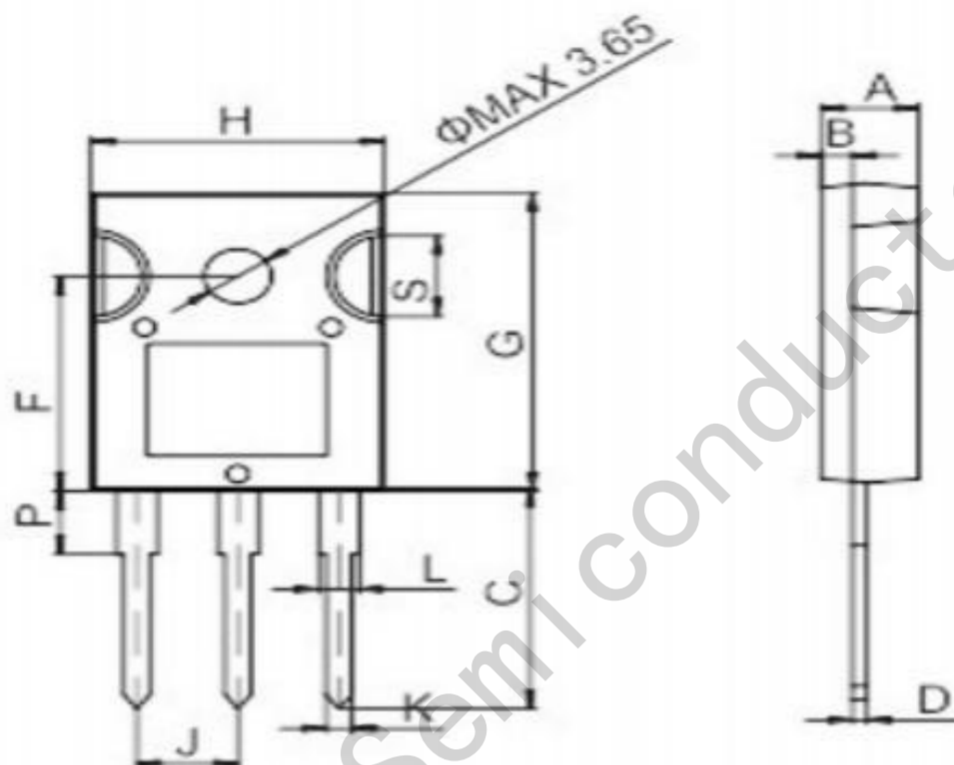


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



TO-247



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