N-Channel Super Gate Trench Power MOSFET

RCS023N10BQ

FEATURES

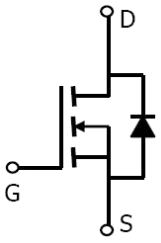
- Super TrenchFET® Power MOSFET
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

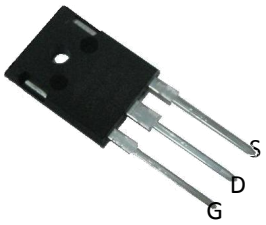
- Primary Side Switch
- Other Applications
- Uninterruptible power supply

Parameter Summary

VDS*:100V* **ID** (at VGS=10V) ***:180A*** **Rds(on)** (at VGS=10V) ***:1.8mΩ(Typ.)***



Symbol



TO-247

Device Ordering Marking Packing Information

Ordering Number	Package	Marking	Packing
RCS023N10BQ	TO-247	RCS023N10BQ	Tube

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
			TO-247	
Drain-Source Voltage (V_{GS} = 0V)		V_{DSS}	100	V
Continuous Drain Current Package Limited			180	A
Continuous Drain Current	Silicon Limited	I_D	305	A
Continuous Drain Current @T_C=100° C	Silicon Limited	I_D	190	A
Pulsed Drain Current (note1)		I_{DM}	720	A
Gate-Source Voltage		V_{GSS}	±20	V
Single Pulse Avalanche Energy (note2)		E_{AS}	900	mJ
Power Dissipation (T_C = 25ºC)		P_D	416	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	ºC

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

Thermal Resistance

Parameter	Symbol	Value	Unit
		TO-247	
Thermal Resistance, Junction-to-Case	R_{thJC}	0.3	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	

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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	100	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =100, V_{GS} = 0V, T_J = 25ºC	--	--	1.0	μA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	I_{DS} = 250μA	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D =50A	--	1.8	2.3	mΩ
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 50V, f = 1.0MHz	--	11000	--	pF
Output Capacitance	C_{oss}		--	1700	--	
Reverse Transfer Capacitance	C_{rss}		--	350	--	
Total Gate Charge	Q_g	V_{DD} = 50V, I_D = 100A, V_{GS} = 10V	--	224	--	nC
Gate-Source Charge	Q_{gs}		--	80	--	
Gate-Drain Charge	Q_{gd}		--	38	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 50V, I_D =100A,V_{GS} = 10V R_G =1.6 Ω	--	35	--	ns
Turn-on Rise Time	t_r		--	25	--	
Turn-off Delay Time	$t_{d(off)}$		--	75	--	
Turn-off Fall Time	t_f		--	30	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25 ºC	--	--	180	A
Pulsed Diode Forward Current	I_{SM}		--	--	720	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 50A, V_{GS} = 0V	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V,I_S = 100A, di_F/dt =500A /μs	--	100	--	ns
Reverse Recovery Charge	Q_{rr}		--	280	--	nC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25 ºC
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

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Figure 1. Safe Operating Area

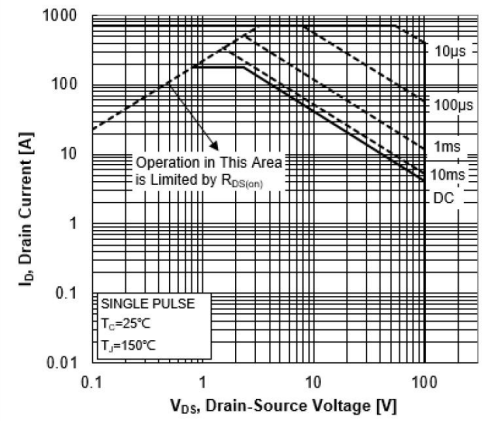

Figure 2. Maximum Power Dissipation vs Case Temperature

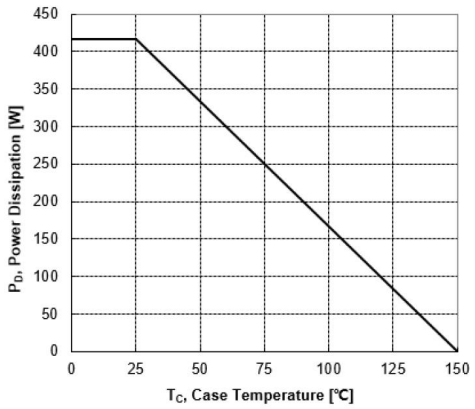

Figure 3. Maximum Continuous Drain Current vs Case Temperature

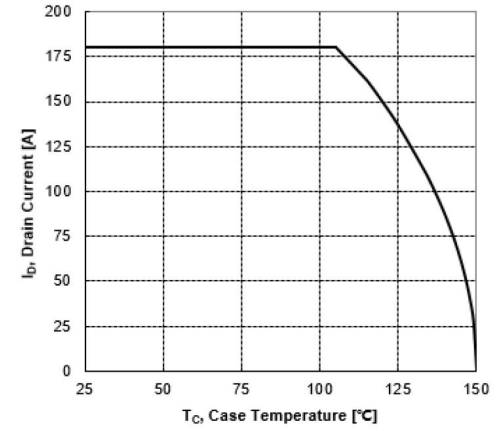

Figure 4. Typical Output Characteristics

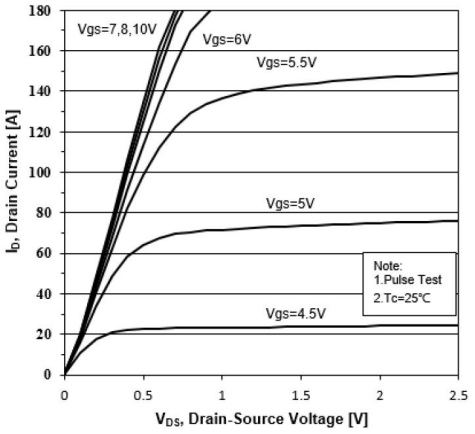

Figure 5. Transient Thermal Impedance

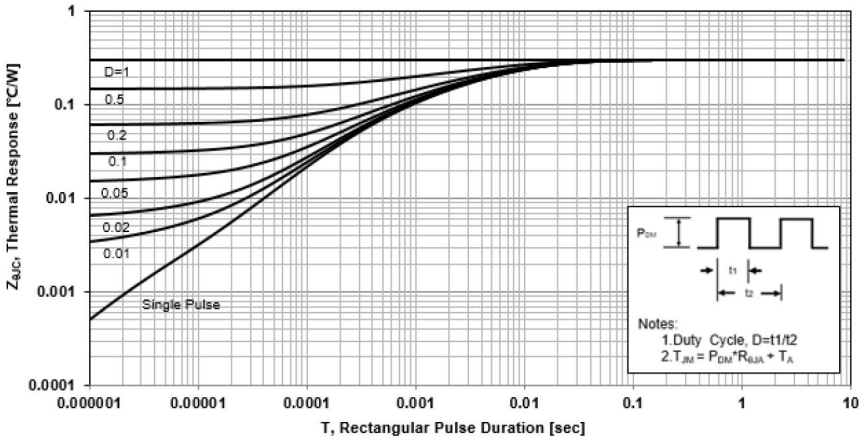

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Figure 6. Typical Transfer Characteristics

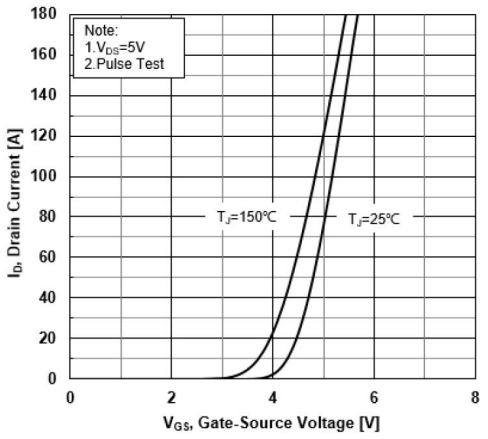

Figure 7. Source-Drain Diode Forward Characteristics

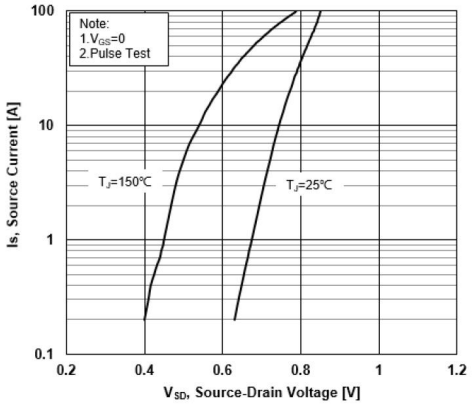

Figure 8. Drain-Source On-Resistance vs Drain Current

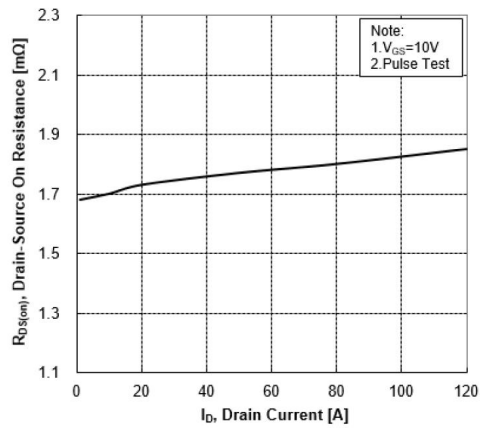

Figure 9. Normalized On-Resistance vs Junction Temperature

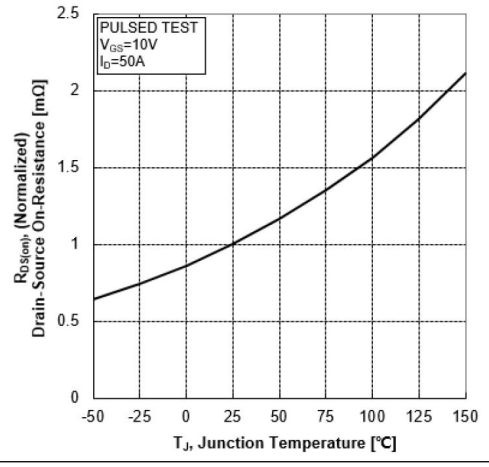

Figure 10. Normalized Threshold Voltage vs Junction Temperature

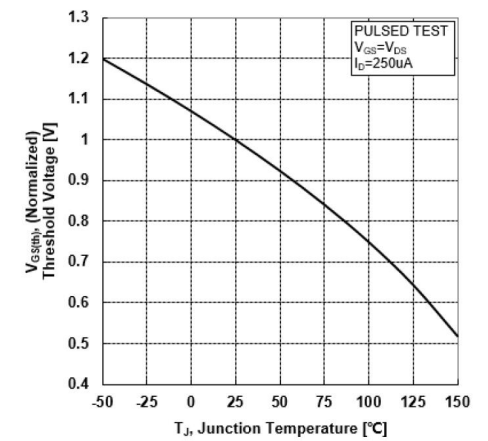

Figure 11. Normalized Breakdown Voltage vs Junction Temperature

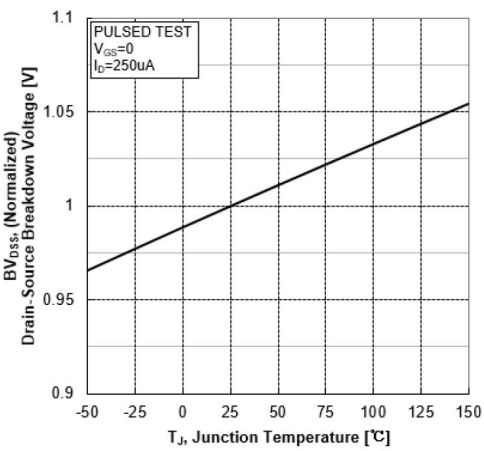

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Figure 12. Capacitance Characteristics

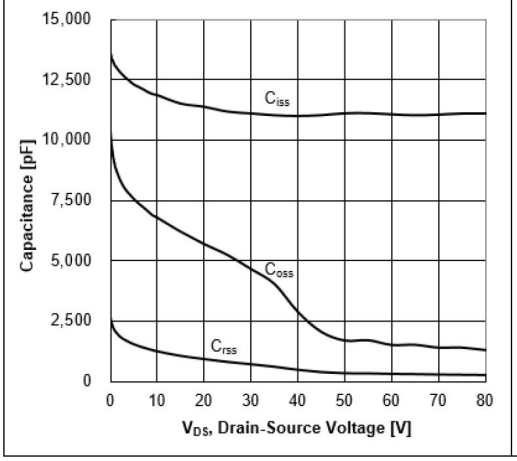
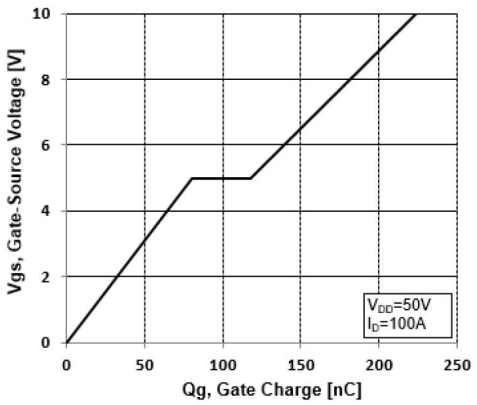


Figure 13. Typical Gate Charge vs Gate-Source Voltage



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TEST CIRCUITS AND WAVEFORMS

Figure A：Gate Charge Test Circuit and Waveform

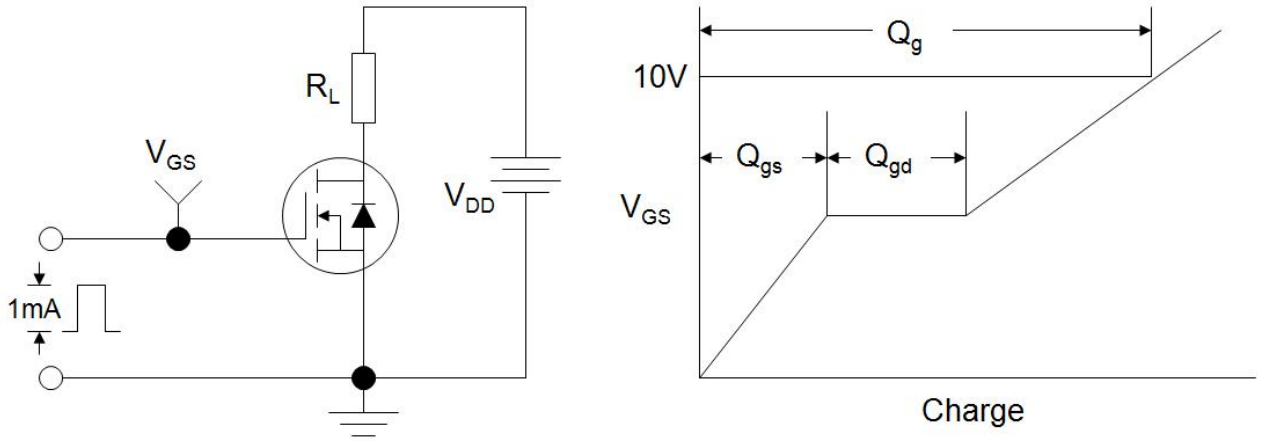

Figure B：Resistive Switching Test Circuit and Waveform

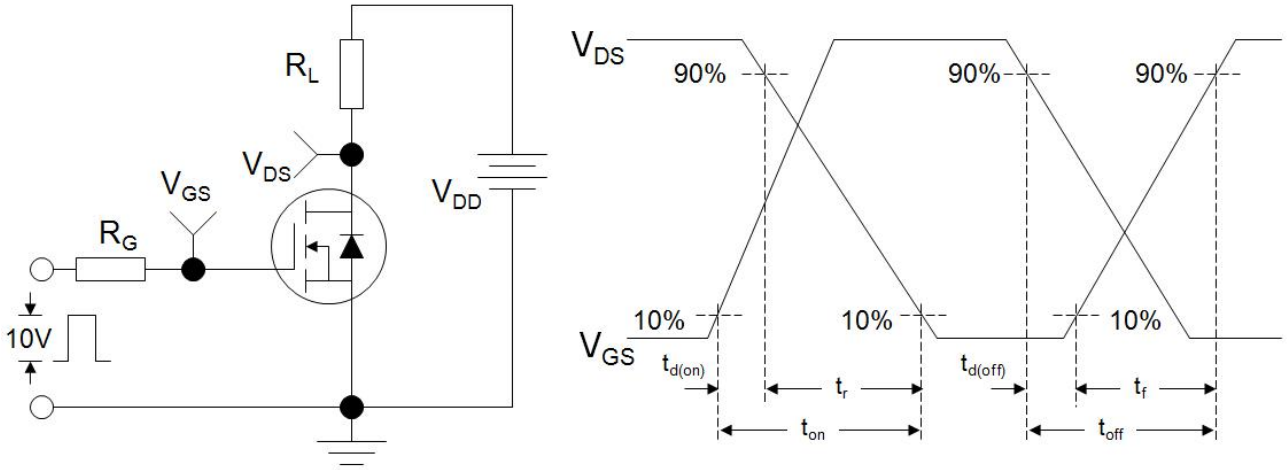

Figure C：Unclamped Inductive Switching Test Circuit and Waveform