

General Description

The XXW20N04Q uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a wide variety of applications.

Features

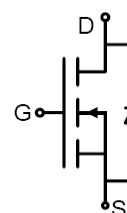
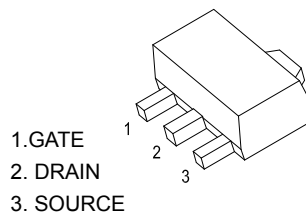
- $V_{DS} = 40V, I_D = 20A$
 $R_{DS(ON)} < 20m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 34m\Omega @ V_{GS} = 4.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

- PWM applications
- Load switch
- Power management

100% UIS TESTED!
100% ΔV_{ds} TESTED!

SOT-89-3L



Schematic Diagram

Table 1. Absolute Maximum Ratings ($T_A = 25^\circ C$)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage ($V_{GS} = 0V$)	40	V
V_{GS}	Gate-Source Voltage ($V_{DS} = 0V$)	± 20	V
I_D	Drain Current-Continuous ($T_C = 25^\circ C$)	20	A
	Drain Current-Continuous ($T_C = 100^\circ C$)	21	A
$I_{DM} (pulse)$	Drain Current-Continuous@ Current-Pulsed (Note 1)	120	A
P_D	Maximum Power Dissipation ($T_C = 25^\circ C$)	38	W
	Maximum Power Dissipation ($T_C = 100^\circ C$)	19	W
E_{AS}	Avalanche energy (Note 2)	100	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	$^\circ C$

Table 2. Thermal Characteristic

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4	$^\circ C/W$

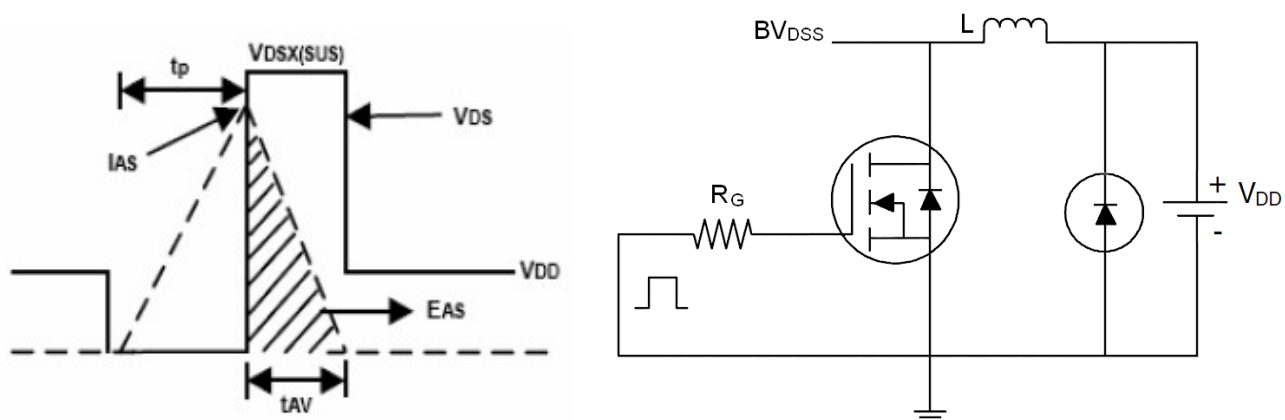
Table 3. Electrical Characteristics (TA=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V			1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1	2	3	V
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =10A		18		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =20A		14	20	mΩ
		V _{GS} =4.5V, I _D =15A		24	34	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		840		pF
C _{oss}	Output Capacitance			92		pF
C _{rss}	Reverse Transfer Capacitance			60		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		2.7		Ω
Switching Times						
t _{d(on)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		5		nS
t _r	Turn-on Rise Time			12		nS
t _{d(off)}	Turn-Off Delay Time			20		nS
t _f	Turn-Off Fall Time			4.5		nS
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A		20		nC
Q _{gs}	Gate-Source Charge			2.5		nC
Q _{gd}	Gate-Drain Charge			4.5		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current(Body Diode)				20	A
V _{SD}	Forward on Voltage	V _{GS} =0V, I _S =20A			1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=100A/μs		7		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=100A/μs		5		nC

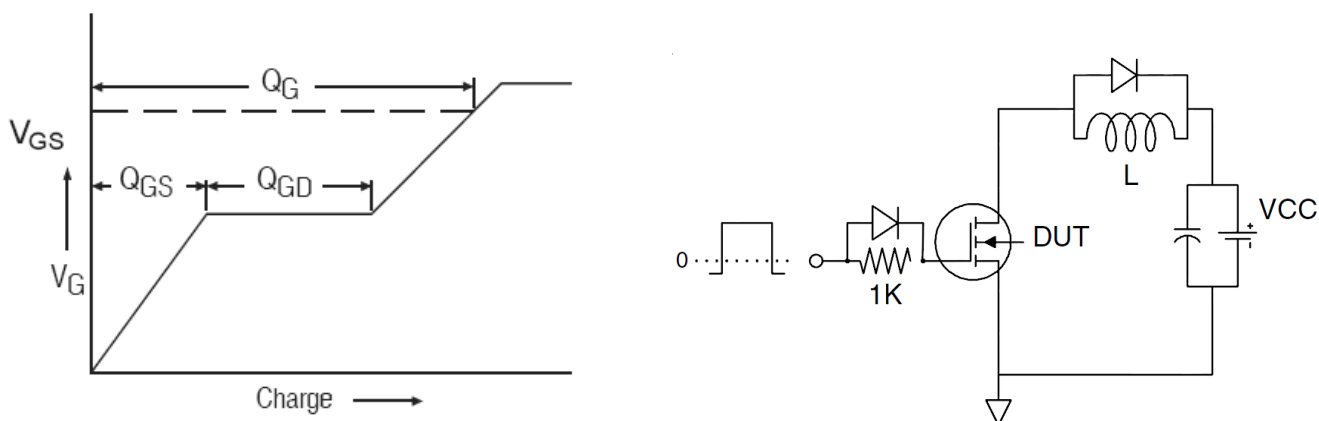
Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 2.EAS condition: T_J=25℃, V_{DD}=15V, V_G=10V, R_G=25Ω

1) E_{AS} Test Circuits



2) Gate Charge Test Circuit:



3) Switch Time Test Circuit:

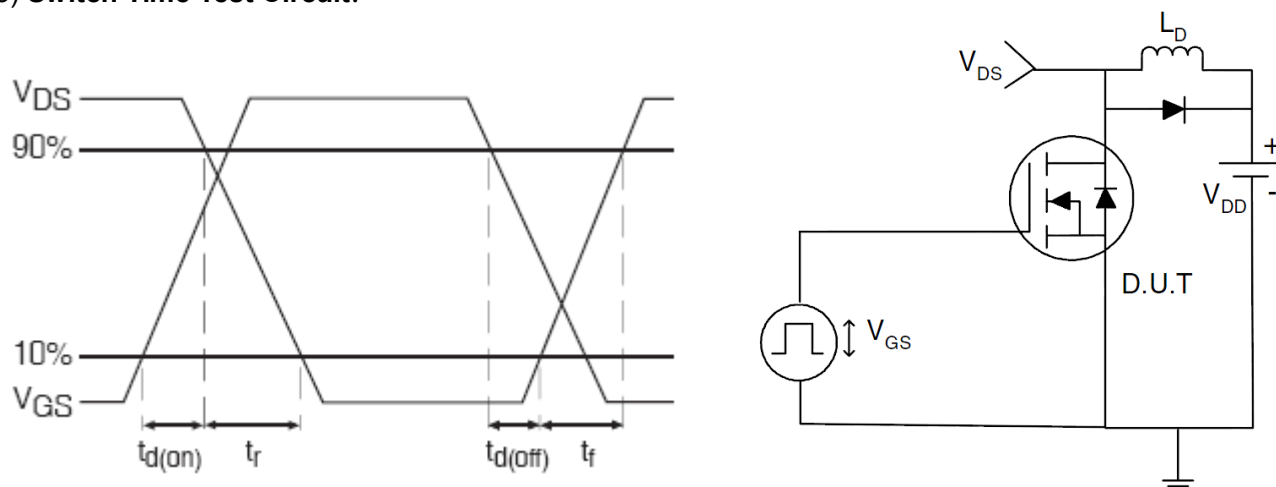


Figure 1. Output Characteristics

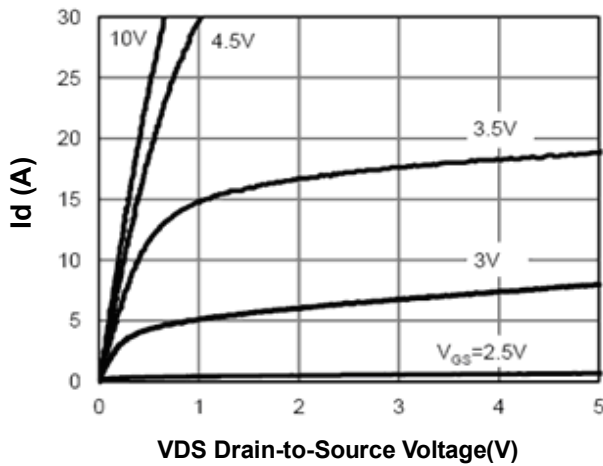


Figure 2. Transfer Characteristics

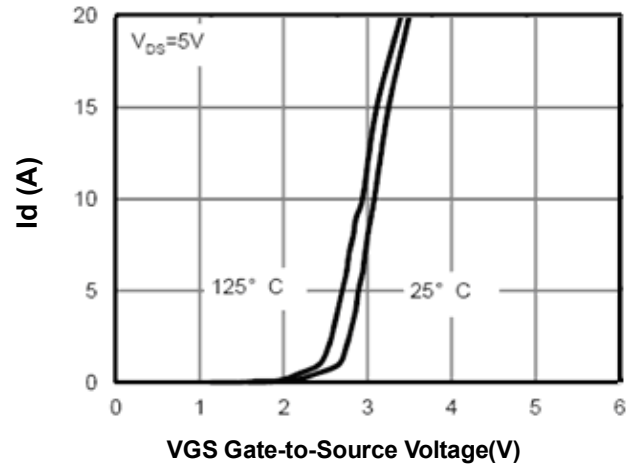


Figure 3. Max BV_{DSS} vs Junction Temperature

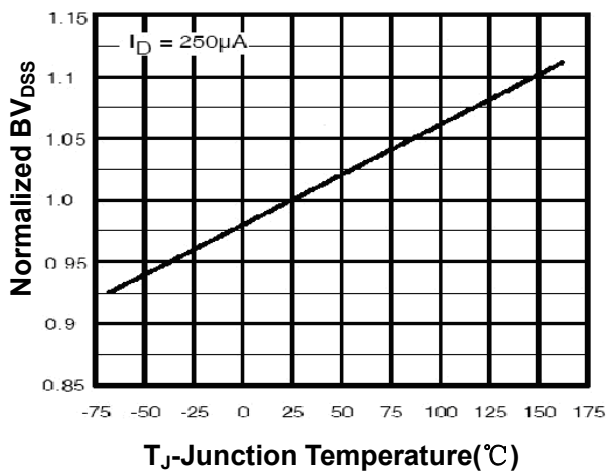


Figure 4. Drain Current

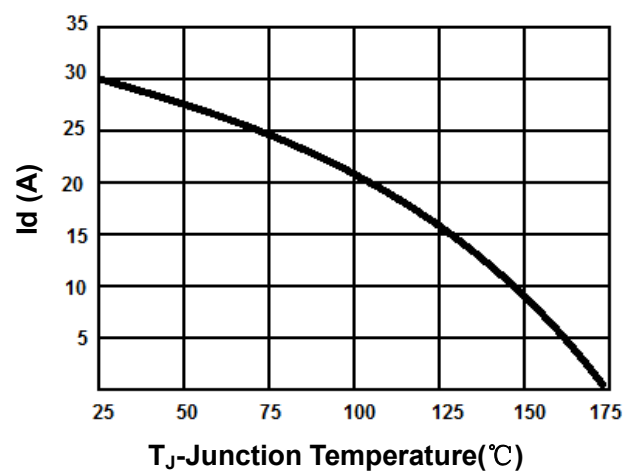


Figure 5. $V_{GS(th)}$ vs Junction Temperature

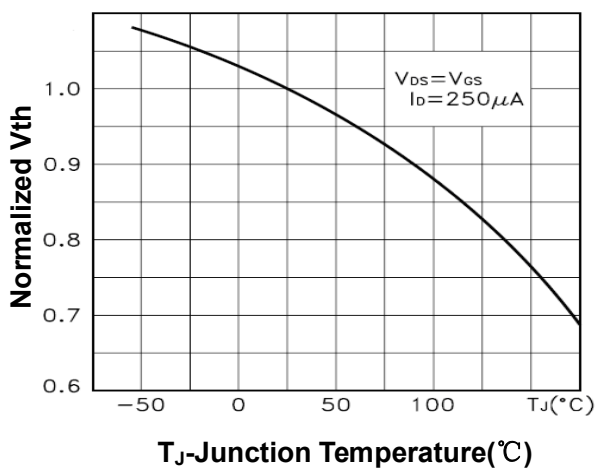
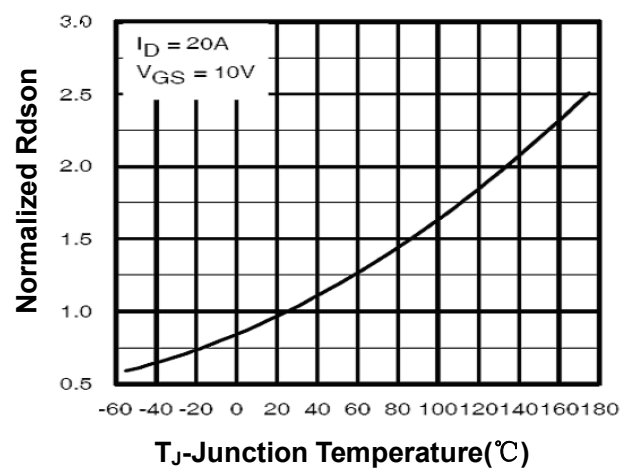


Figure 6. $R_{DS(on)}$ vs Junction Temperature



N-Ch 40V Fast Switching MOSFETs

Figure 7. Gate Charge Waveforms

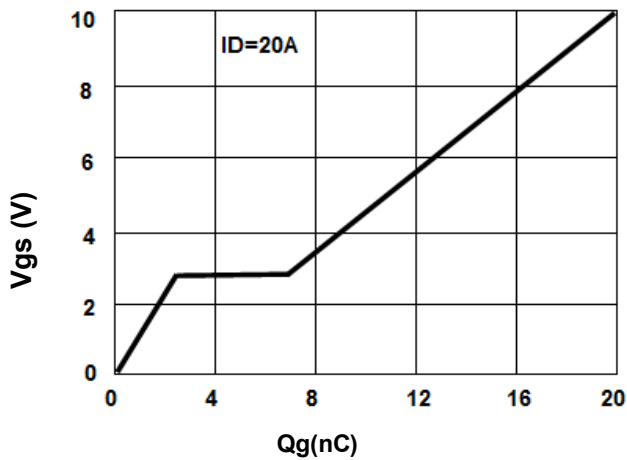


Figure 8. Capacitance

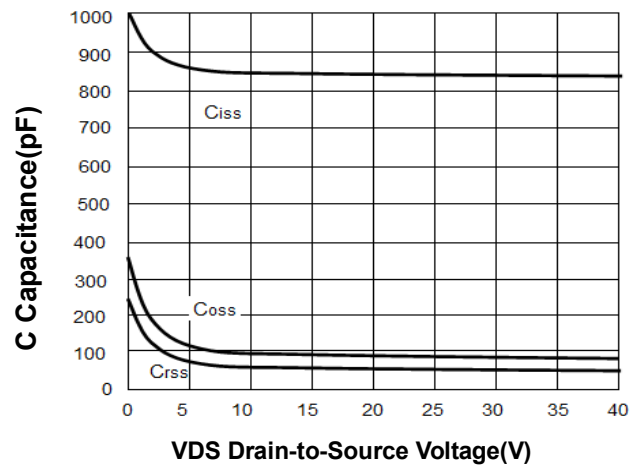


Figure 9. Body-Diode Characteristics

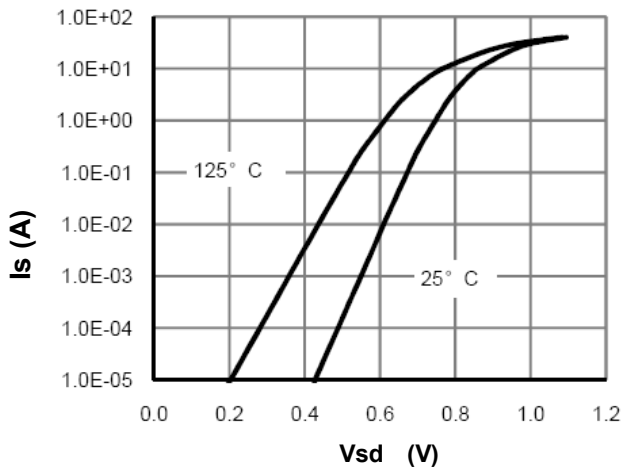


Figure 10. Maximum Safe Operating Area

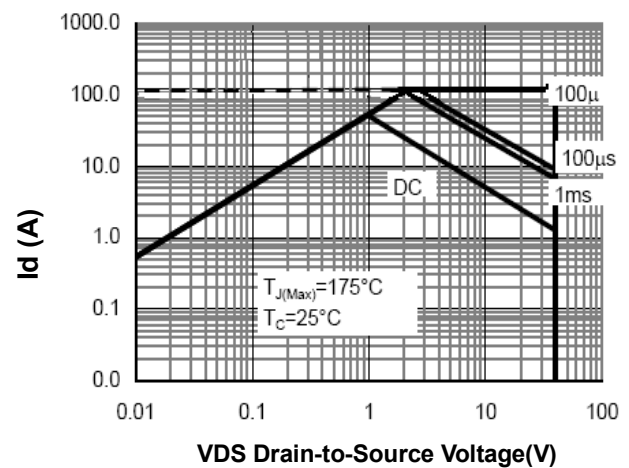
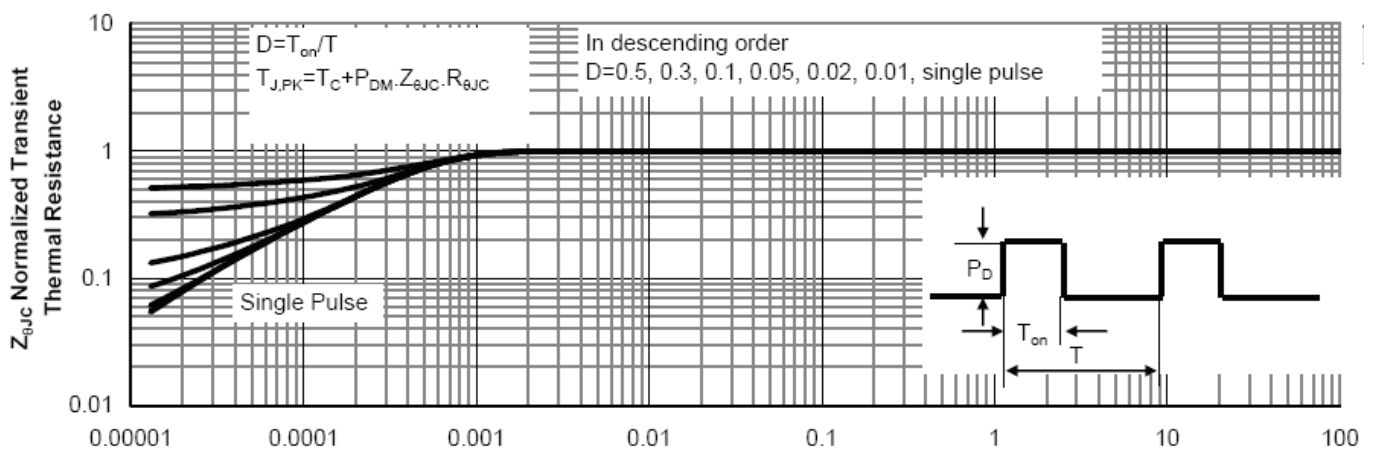
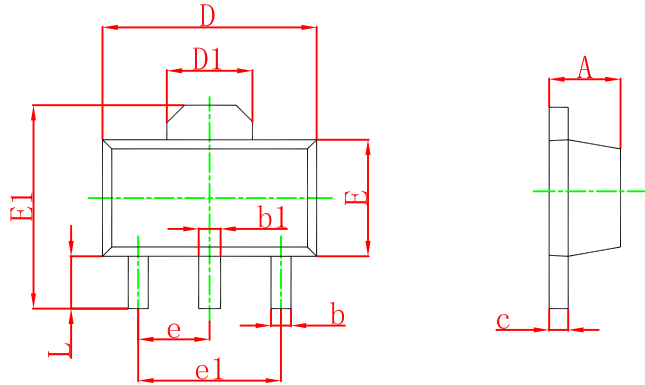


Figure 11. Normalized Maximum Transient Thermal Impedance





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047