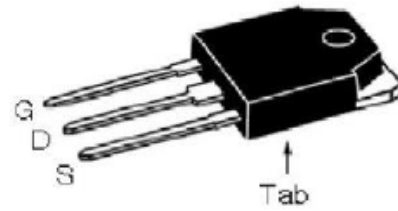


900V N-Channel Power MOSFET

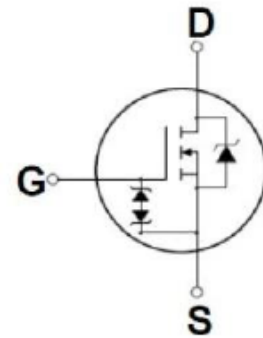
Features

- High Voltage: $BV_{DSS}=900V(\text{Min.})$
- $I_D : 9A$
- Robust high voltage termination
- Avalanche energy specified
- Improved dv/dt capability
- Low gate charge



Application

- Ballast Bridge
- Switch Mode Power Supplier
- Power Factor Correction
- Lighting



Ordering Information

Type NO	Marking	Package Code
WMQ9N90	9N90Q	TO-3P

Absolute Maximum Ratings

($T_C=25^\circ\text{C}$)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	900	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current	I_D	$T_C = 25^\circ\text{C}$	9
		$T_C = 100^\circ\text{C}$	5.9
Pulsed Drain Current (Note 1)	I_{DM}	456	A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	201	mJ
Repetitive Avalanche Current (Note 1)	I_{AR}	9	A
Repetitive Avalanche Energy (Note 1)	E_{AR}	31.2	mJ
Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	312
		Derate above 25°C	2.5
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300	$^\circ\text{C}$

* Limited by maximum junction temperature

Parameter	Symbol	Value	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	0.4	$^\circ\text{C/W}$
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

* Note: Surface mounted on FR4 board $t \leq 10\text{sec}$

Electrical Characteristics

(Tc=25°C)

Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 900\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 720\text{ V}, T_C = 125^\circ\text{C}$	--	--	100	μA
Forward Gate-Source Leakage Current	I_{GSSF}	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
Reverse Gate-Source Leakage Current	I_{GSSR}	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

ON

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 4.5\text{ A}$	--	1.12	1.4	Ω
Forward Transconductance ^(Note 4)	g_{FS}	$V_{DS} = 30\text{ V}, I_D = 4.5\text{ A}$	--	17	--	S

DYNAMIC

Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	2740	--	pF
Output Capacitance	C_{oss}		--	192	--	pF
Reverse Transfer Capacitance	C_{rss}		--	27	--	pF

SWITCHING

Turn-On Delay Time ^(Note 4,5)	$t_{d(on)}$	$V_{DD} = 400\text{ V}, I_D = 9\text{ A},$ $R_G = 25\ \Omega$	--	52	--	ns
Turn-On Rise Time ^(Note 4,5)	t_r		--	97	--	ns
Turn-Off Delay Time ^(Note 4,5)	$t_{d(off)}$		--	212	--	ns
Turn-Off Fall Time ^(Note 4,5)	t_f		--	159	--	ns
Total Gate Charge ^(Note 4,5)	Q_g	$V_{DS} = 720\text{ V}, I_D = 9\text{ A},$ $V_{GS} = 10\text{ V}$	--	72	--	nC
Gate-Source Charge ^(Note 4,5)	Q_{gs}		--	11	--	nC
Gate-Drain Charge ^(Note 4,5)	Q_{gd}		--	31	--	nC

SOURCE DRAIN DIODE

Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	--	9	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	38	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 9\text{ A}$	--	--	1.5	V
Reverse Recovery Time ^(Note 4)	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 9\text{ A}$ $dI_F / dt = 100\text{ A}/\mu\text{s}$	--	570	--	ns
Reverse Recovery Charge ^(Note 4)	Q_{rr}		--	6.6	--	μC

Note :

1. Repeated rating : Pulse width limited by safe operating area
2. $L = 8.9\text{mH}, I_{AS} = 8\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega,$ Starting $T_J = 25\ ^\circ\text{C}$
3. $I_{SD} \leq 8\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DS},$ Starting $T_J = 25\ ^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s},$ Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics

Electrical Characteristic Curves

Fig. 1 Output Characteristics

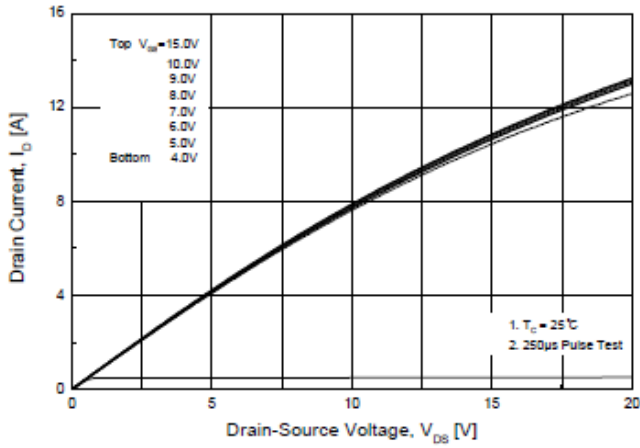


Fig. 2 Transfer Characteristics

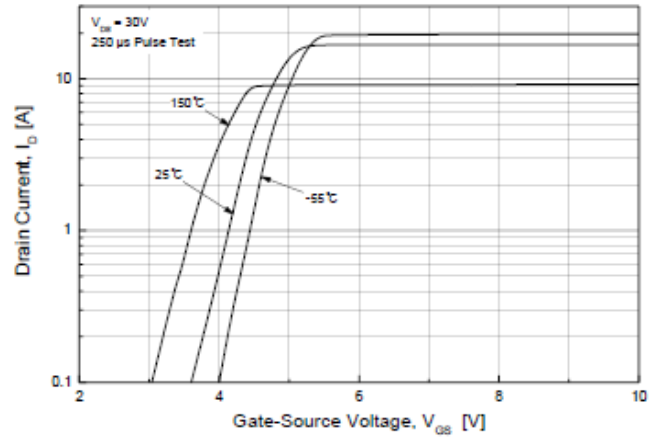


Fig. 3 On-Resistance vs. Drain Current and Gate voltage

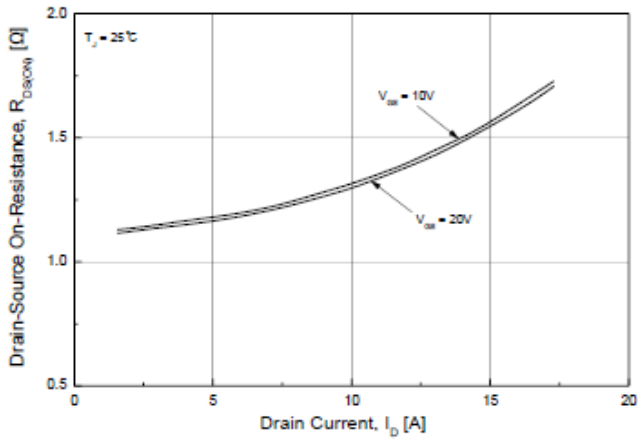


Fig. 4 Body Diode Forward Voltage vs. Source Current and Temperature

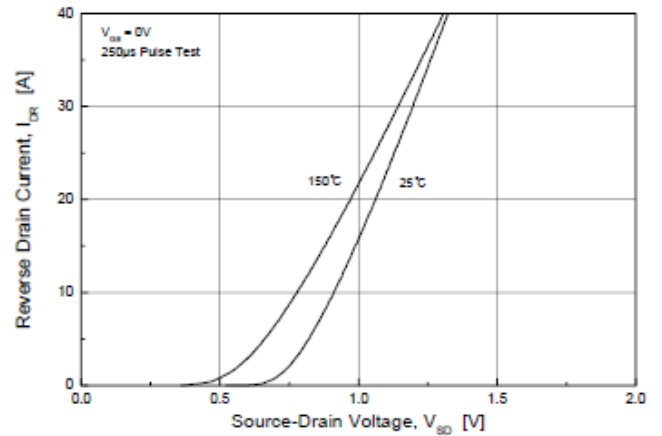


Fig. 5 Capacitance Characteristics

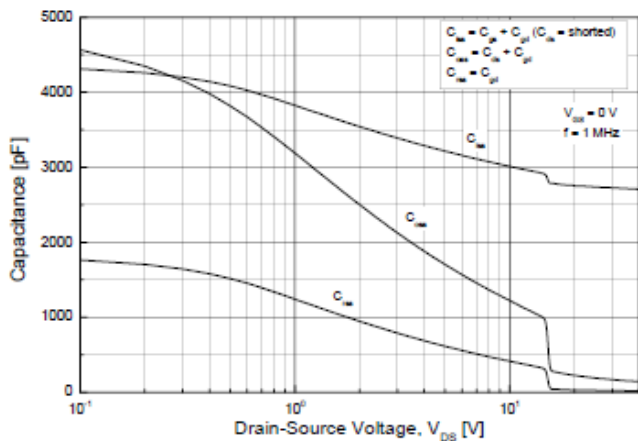


Fig. 6 Gate Charge Characteristics

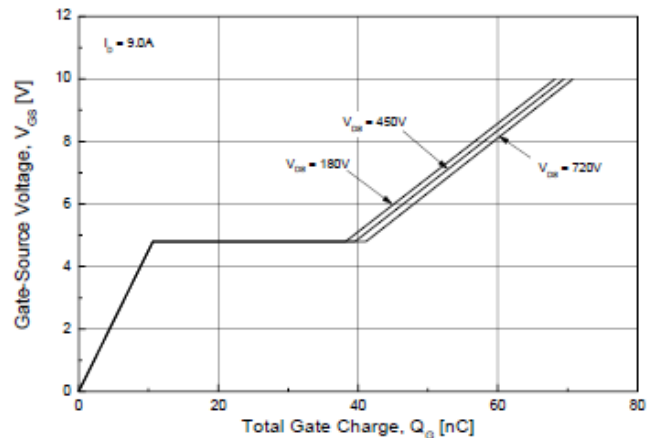


Fig. 7 Breakdown Voltage vs. Temperature

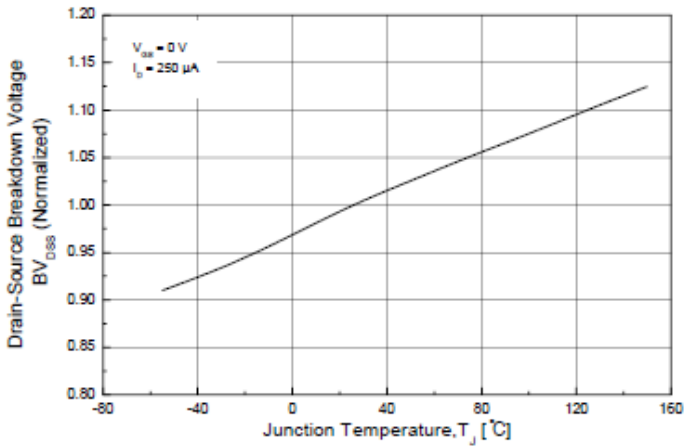


Fig. 8 On-Resistance vs. Temperature

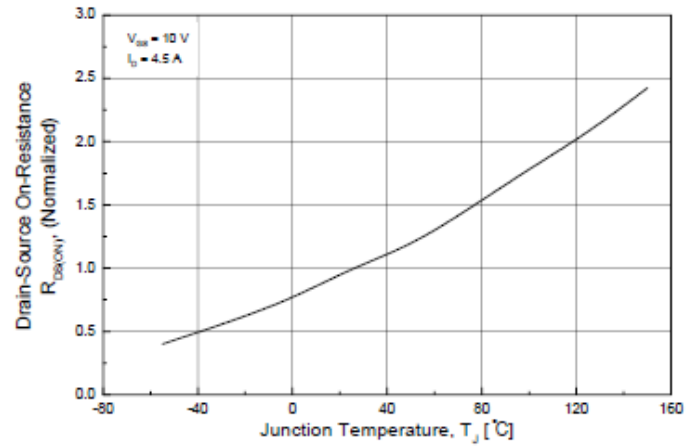


Fig. 9 Maximum Drain Current vs. Case Temperature

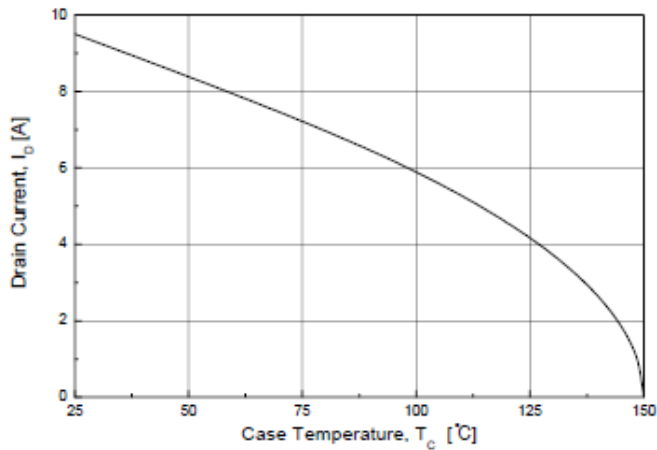


Fig. 10 Gate Threshold Voltage vs. Junction Temperature

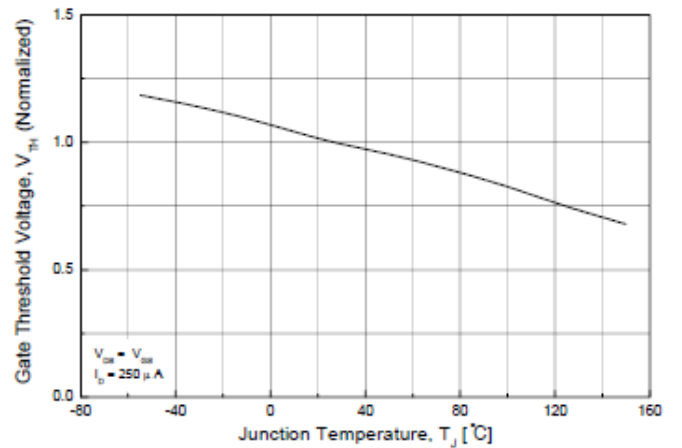


Fig. 11 Maximum Safe Operating Area

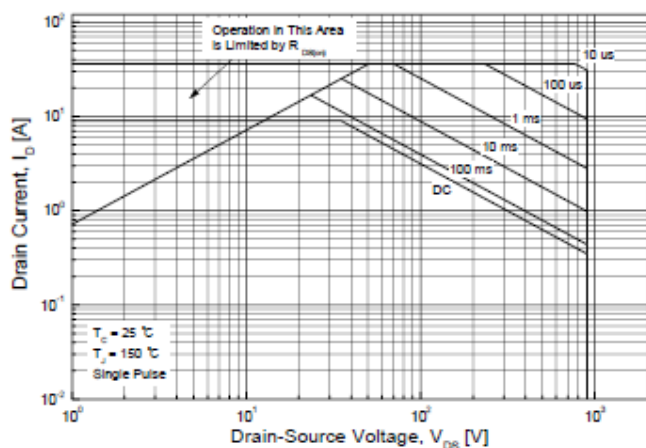
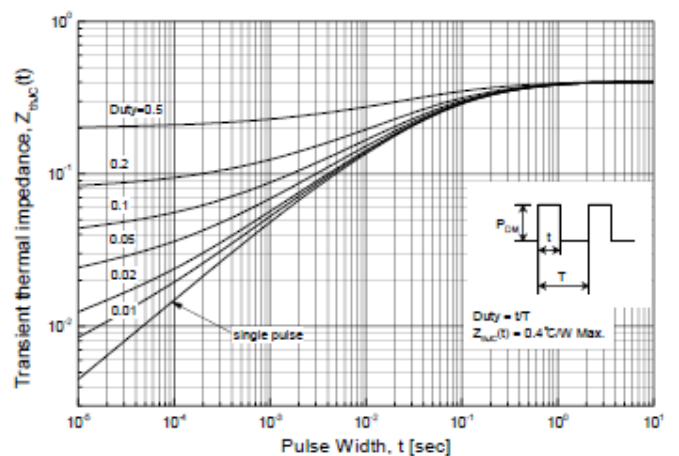
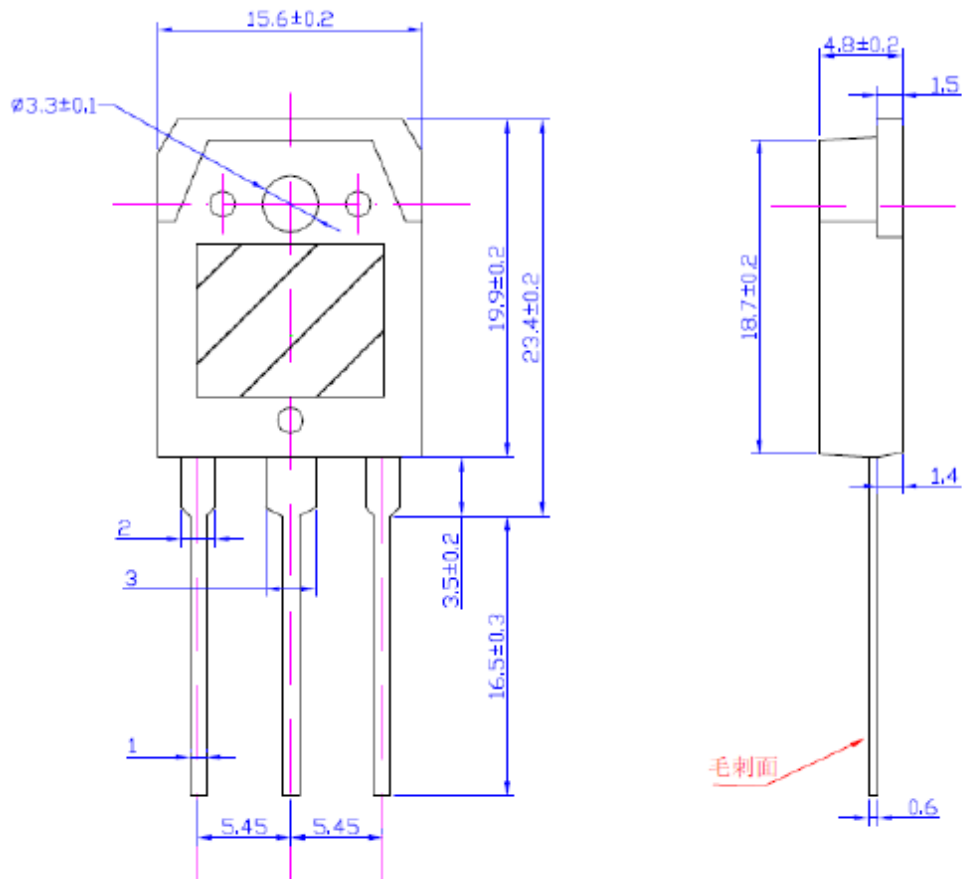


Fig. 12 Transient Thermal Response Curve



Outline Dimension : TO-3P



Unit : mm

Ordering Information

Type NO	Marking	Package Code
WMQ9N90	9N90Q	TO-3P

Marking and Pin Define



First Line	WTC	Company Name	
Second Line	9N90Q	Product Code	
Third Line	BB0MQ	1st (Year Code)	A-2010 B-2011 C-2012 D-2013 ...
		2nd (Month Code)	A-Jan, B-Feb, C-Mar, D-Apr, E-May, F-Jun, G-Jul, H-Aug, I-Sep, J-Oct, K-Nov, L-Dec
		3rd (Lot Code)	0-9, A-Z
		4th (Product Code)	M - MOS, T - Transistor, L - Linear
		5th (Package Code)	I - TO251, D - TO252, L - TO92, M - TO126, X - TO220, F - TO220F, Y - SOT89, S - SOP8, Q - TO3P
		6th (Spec Code)	(Reserve)