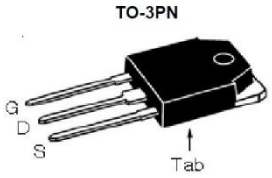
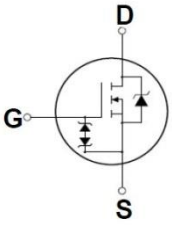
N-channel MOSFET

BV_{DSS}	I_D	$R_{DS(on)}$
900V	9A	<1.4Ω

Features

- Low gate charge
- Improved dv/dt capability
- Improved ESD performance
- RoHS compliant
- JEDEC Qualification





Ordering Part Number	Package	Marking	Remark
TMAN9N90AZ	TO-3PN	TMAN9N90AZ	RoHS

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	900	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C = 25 ℃	I_D	9	A
	T_C = 100 ℃		5.9	A
Pulsed Drain Current (Note 1)		I_{DM}	36	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	456	mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	9	A
Repetitive Avalanche Energy (Note 1)		E_{AR}	31.2	mJ
Power Dissipation	T_C = 25 ℃	P_D	312	W
	Derate above 25 ℃		2.5	W/℃
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	℃
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	℃

* Limited only by maximum junction temperature

Thermal Characteristics

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

Electrical Characteristics : T_C=25℃, unless otherwise noted

Parameter	Symbol	Test condition	Min	Typ	Max	Unit
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 900 V, V_{GS} = 0 V	--	--	10	μA
		V_{DS} = 720 V, T_C = 125 ℃	--	--	100	μA
Forward Gate-Source Leakage Current	I_{GSSF}	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	μA
Reverse Gate-Source Leakage Current	I_{GSSR}	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	μA
ON						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.0	--	4.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 4.5 A	--	1.12	1.4	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 4.5 A	--	17	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 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} = 450 V, I_D = 9 A, R_G = 25 Ω	--	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 V, I_D = 9 A, V_{GS} = 10 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	----	--	--	9.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	----	--	--	38	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 9 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 9 A, dI_F / dt = 100 A/μs	--	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=10.6mH, I_{AS} = 9A, V_{DD} = 50V, R_G = 25Ω, Starting T_J= 25 ℃, not subject to production test – verified by design/characterization
3 I_{SD} ≤ 9A, di/dt ≤ 200A/μs , V_{DD} ≤ BV_{DS}, Starting T_J= 25 ℃
4. Pulse Test :Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Fig. 1 Output Characteristics

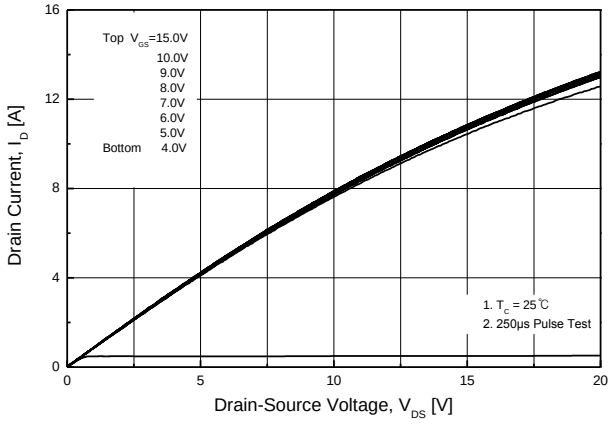


Fig. 2 Transfer Characteristics

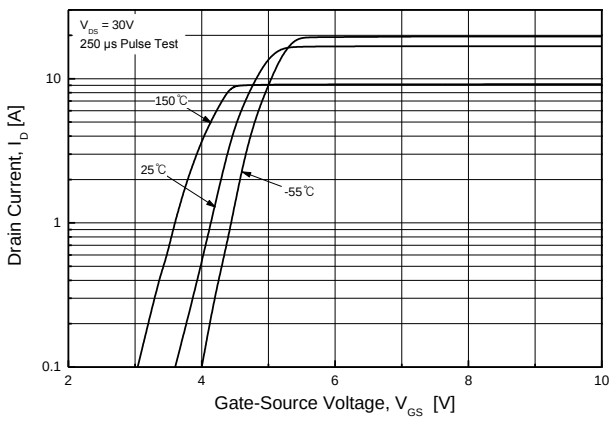


Fig. 3 On-Resistance vs.
Drain Current and Gate voltage

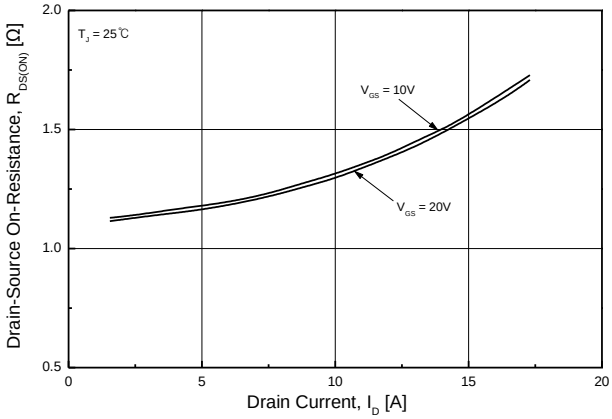


Fig. 4 Body Diode Forward Voltage vs.
Source Current and Temperature

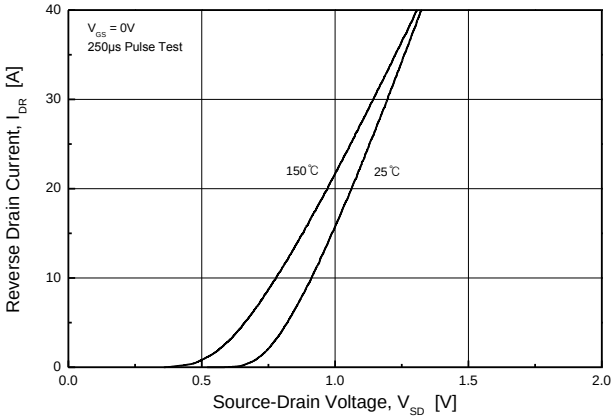


Fig. 5 Capacitance Characteristics

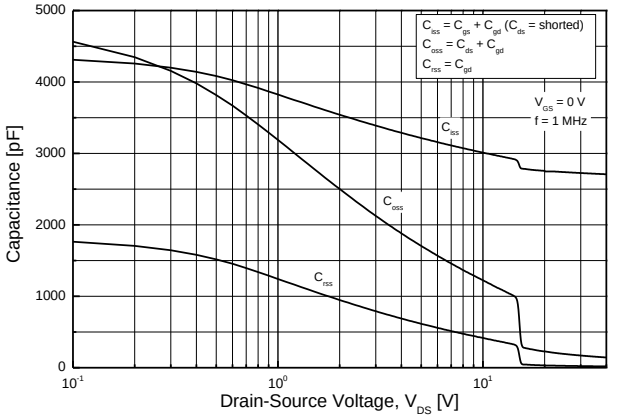


Fig. 6 Gate Charge Characteristics

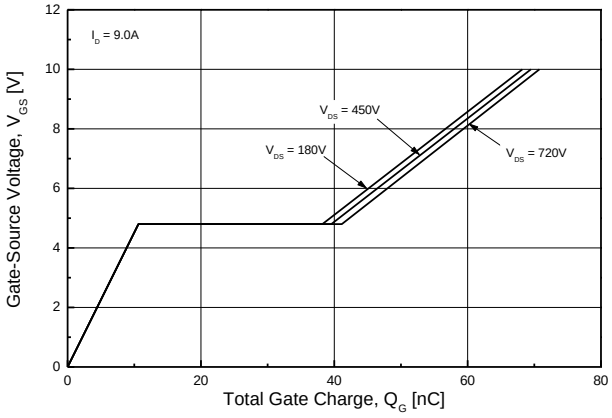


Fig. 7 Breakdown Voltage vs. Temperature

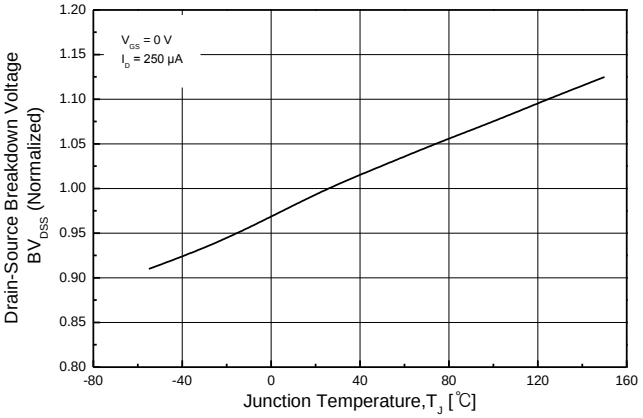


Fig. 8 On-Resistance vs. Temperature

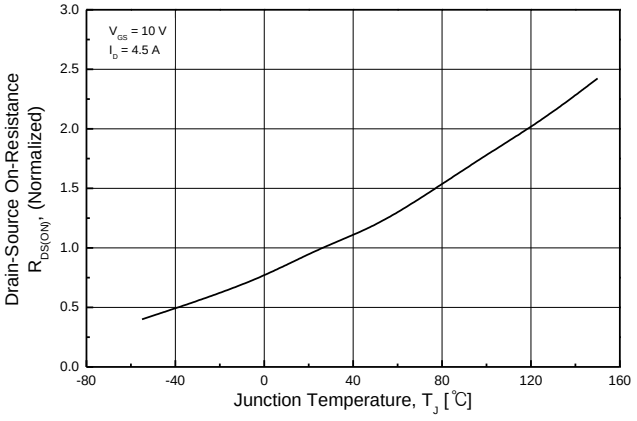


Fig. 9 Maximum Drain Current vs. Case Temperature

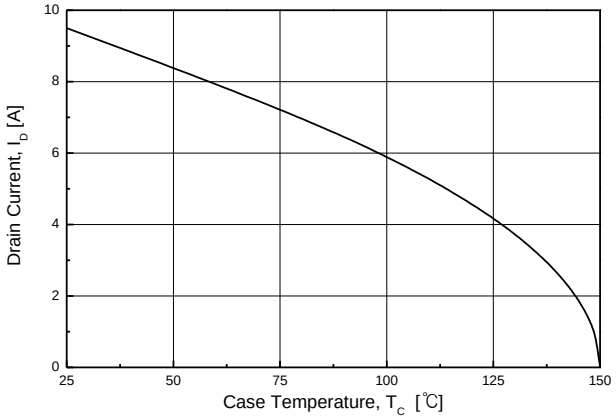


Fig. 10 Gate Threshold Voltage vs. Junction Temperature

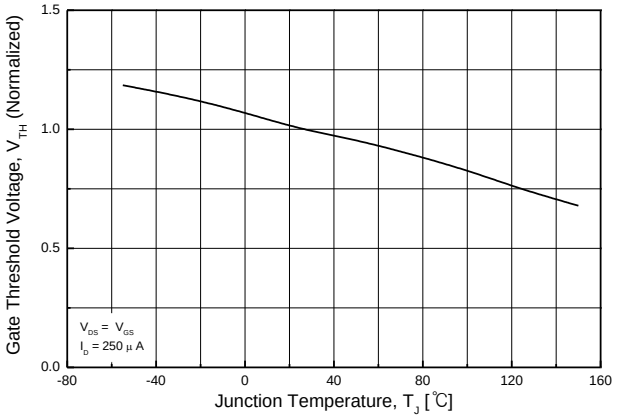


Fig. 11 Maximum Safe Operating Area

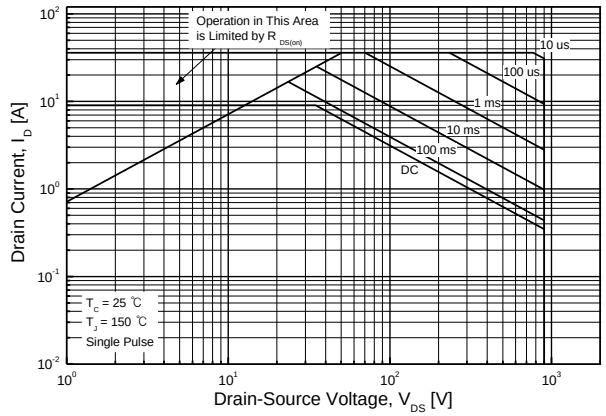
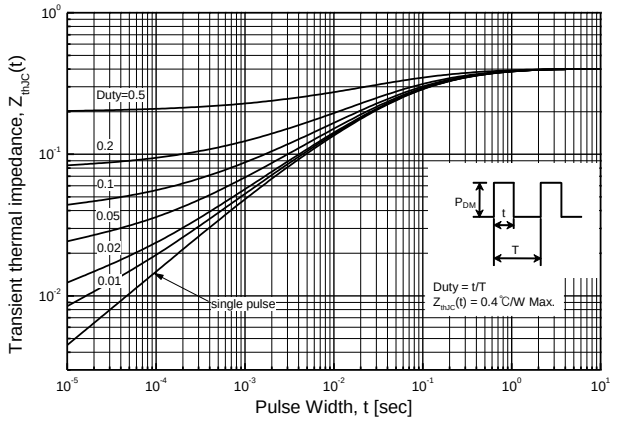
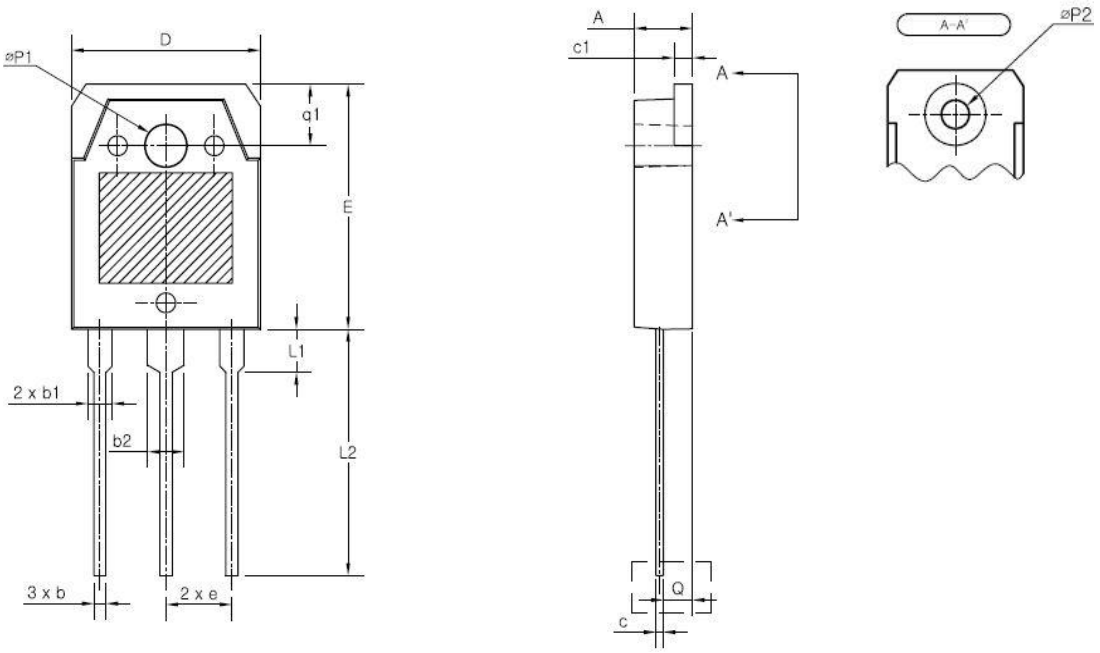


Fig. 12 Transient Thermal Response Curve



TO-3PN MECHANICAL DATA



SYMBOL	MIN	NOM	MAX
A	4.60	4.80	5.00
b	0.80	1.00	1.20
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.55	0.60	0.75
c1	1.45	1.50	1.65
D	15.40	15.60	15.80
E	19.70	19.90	20.10
e	5.15	5.45	5.75
L1	3.30	3.50	3.70
L2	19.80	20.00	20.20
øP1	3.30	3.40	3.50
øP2		(3.20)	
Q	2.20	2.40	2.60
q1	4.80	5.00	5.20