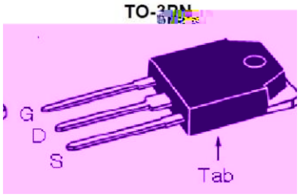
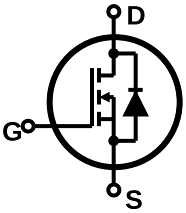
TMAN10N80

Features
- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant
- JEDEC Qualification

V_{DSS} = 880 V @T_{jmax}
I_D = 10A
$R_{DS(on)}$ = 1.05 Ω(max) @ V_{GS}= 10 V





Device	Package	Marking	Remark
TMAN10N80	TO-3P	TMAN10N80	RoHS

Absolute Maximum Ratings

Parameter		Symbol	TMAN10N80	Unit
Drain-Source Voltage		V_{DS}	900	V
Gate-Source Voltage		V_{GS}	30	V
Continuous Drain Current	T_C = 25	I_D	10	A
	T_C = 100		6.6	A
Pulsed Drain Current (Note 1)		I_{DM}	40	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	267	mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	10	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,		T_L	300	

* Limited only by maximum junction temperature

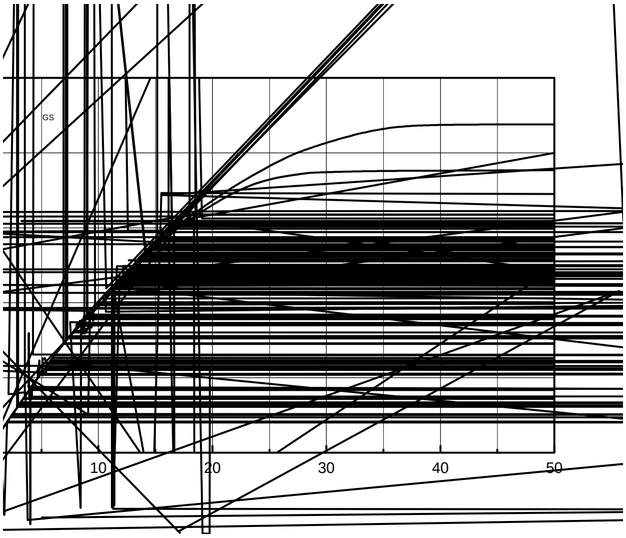
Thermal Characteristics

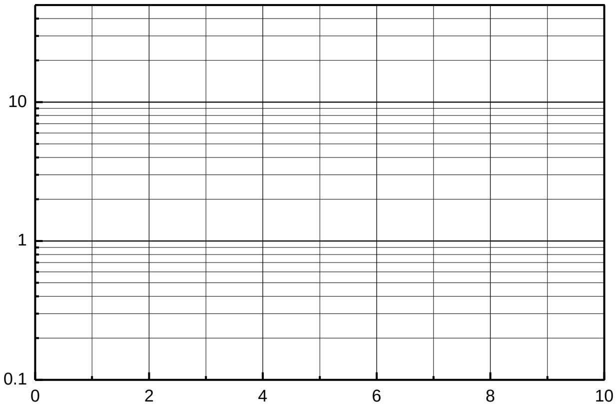
Parameter	Symbol	TMAN10N80	Unit
Maximum Thermal resistance, Junction to Case	$R_{\theta JC}$	0.4	/W
Typical Thermal resistance, Case to Sink(Typical)	$R_{\theta CS}$	0.24	/W
Maximum Thermal resistance, Junction to Ambient	$R_{\theta JA}$	40	/W

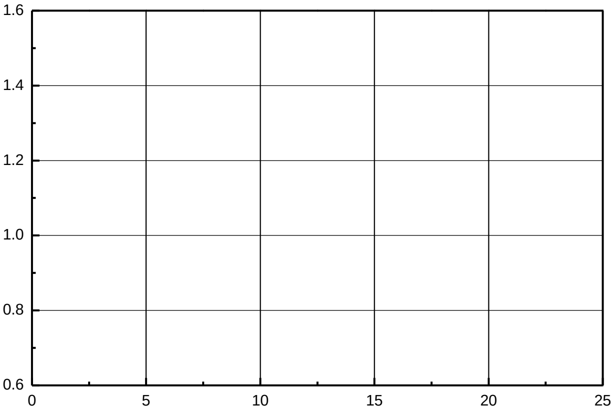
Electrical Characteristics : T_C=25 , unless otherwise noted

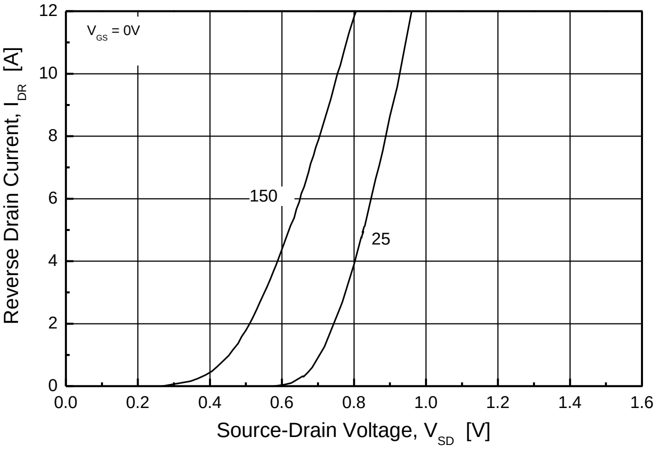
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 µA	800	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 800 V, V_{GS} = 0 V	--	--	10	µA
		V_{DS} = 640 V, T_C = 125°C	--	--	100	µA
Forward Gate-Source Leakage Current	I_{GSSF}	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
Reverse Gate-Source Leakage Current	I_{GSSR}	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
ON						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 5 A	--	0.9	1.05	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 5 A	--	6.3	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	2336	--	pF
Output Capacitance	C_{oss}		--	214	--	pF
Reverse Transfer Capacitance	C_{rss}		--	29	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 400 V, I_D = 10 A, R_G = 25	--	63	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	62	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	256	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	72	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 640V, I_D = 10 A, V_{GS} = 10 V	--	53	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	10	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	22.3	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	--	10	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	40	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 10 A dI_F / dt = 100 A/µs	--	453	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	5.3	--	µC

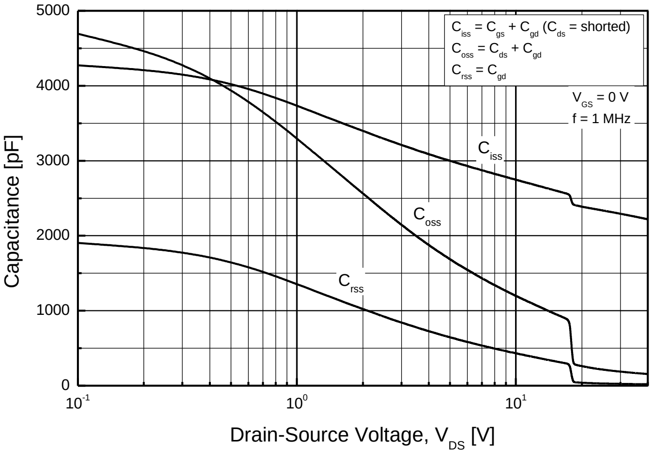
Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L=5mH, I_{AS} = 10A, V_{DD} = 50V, R_G = 25 , Starting T_J= 25
3 I_{SD} di/dt µs , V_{DD} $_{DS}$, Starting T_J= 25
µ
5. Essentially Independent of Operating Temperature Typical Characteristics

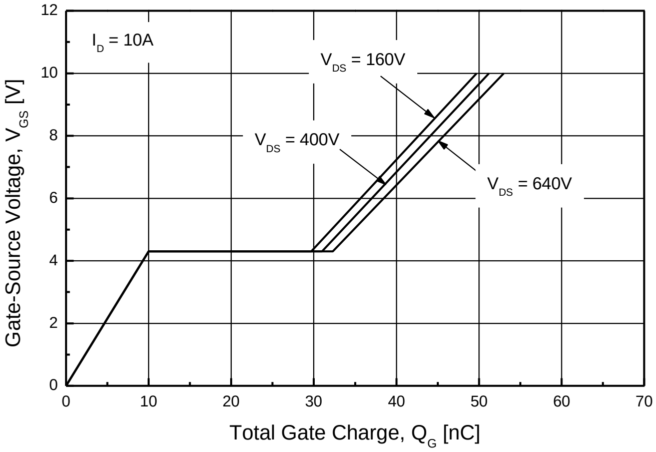

GS
10
20
30
40
50

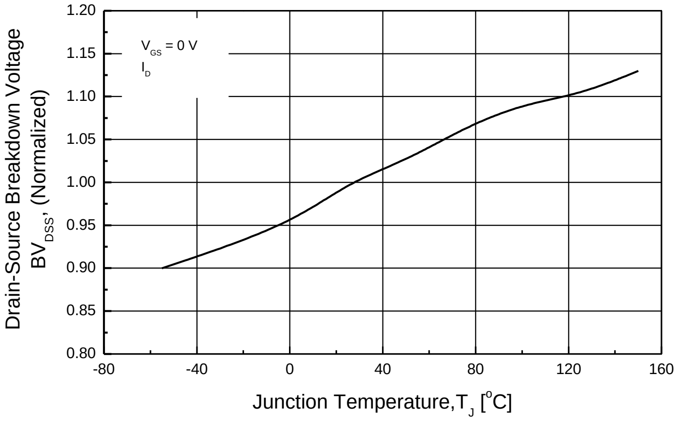

10
1
0.1
0
2
4
6
8
10


1.6
1.4
1.2
1.0
0.8
0.6
0
5
10
15
20
25

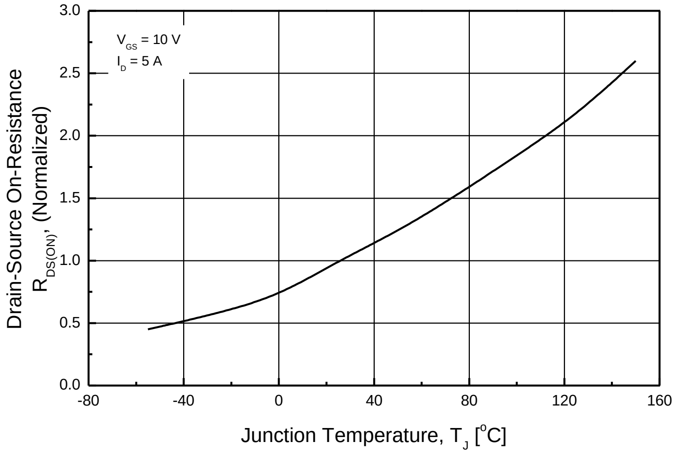

V_GS = 0V
150
25
Reverse Drain Current, I_DR [A]
Source-Drain Voltage, V_SD [V]
0
2
4
6
8
10
12
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6


C_iss = C_gs + C_gd (C_ds = shorted)
C_oss = C_ds + C_gd
C_rss = C_gd
V_GS = 0 V
f = 1 MHz
C_iss
C_oss
C_rss
Capacitance [pF]
Drain-Source Voltage, V_DS [V]
5000
4000
3000
2000
1000
0
10^-1
10^0
10^1

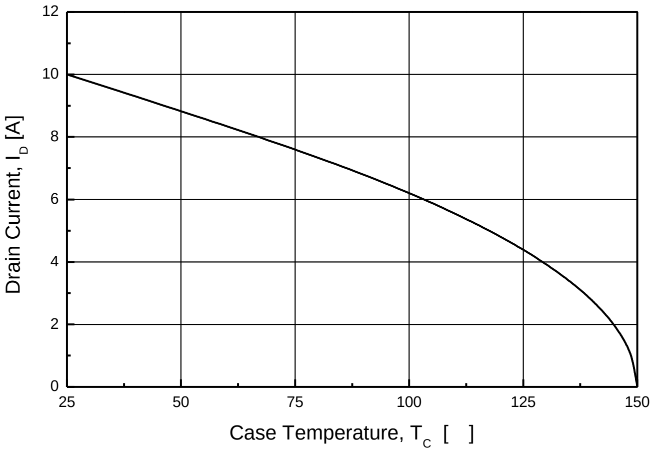

I_D = 10A
V_DS = 160V
V_DS = 400V
V_DS = 640V
Gate-Source Voltage, V_GS [V]
Total Gate Charge, Q_G [nC]
0
2
4
6
8
10
12
0
10
20
30
40
50
60
70



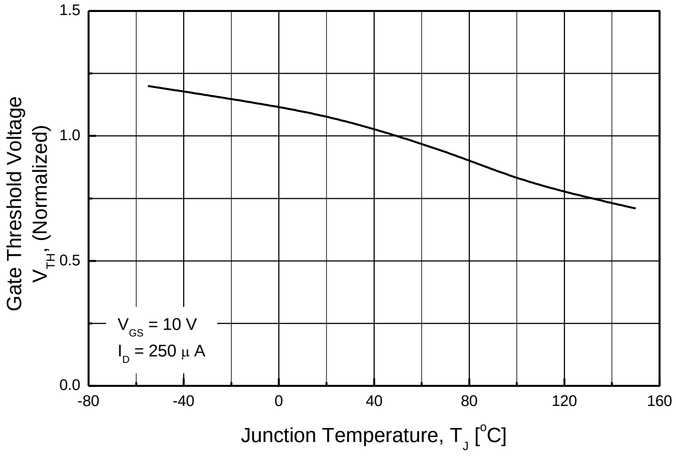
Drain-Source Breakdown Voltage
BV_DSS, (Normalized)
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
V_GS = 0 V
I_D
-80
-40
0
40
80
120
160
Junction Temperature,T_J [°C]



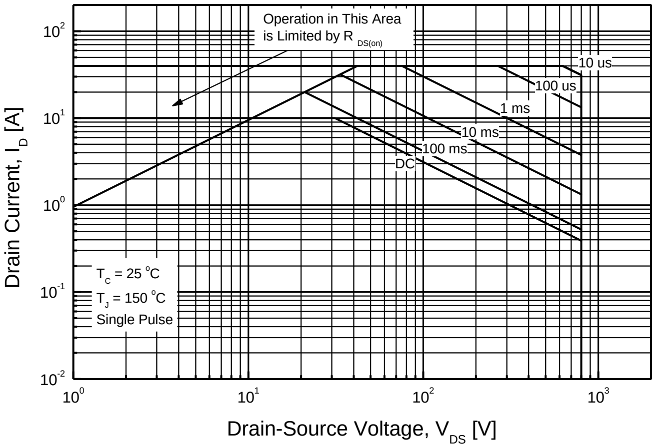
Drain-Source On-Resistance
R_DS(ON), (Normalized)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
V_GS = 10 V
I_D = 5 A
-80
-40
0
40
80
120
160
Junction Temperature, T_J [°C]



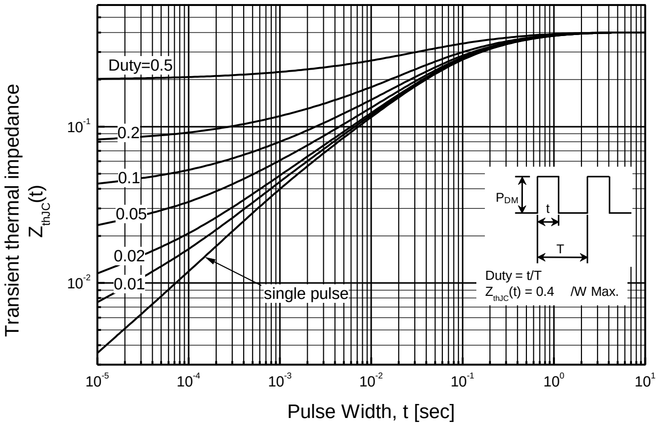
Drain Current, I_D [A]
12
10
8
6
4
2
0
25
50
75
100
125
150
Case Temperature, T_C [ ]



Gate Threshold Voltage
V_TH, (Normalized)
1.5
1.0
0.5
0.0
V_GS = 10 V
I_D = 250 μ A
-80
-40
0
40
80
120
160
Junction Temperature, T_J [°C]

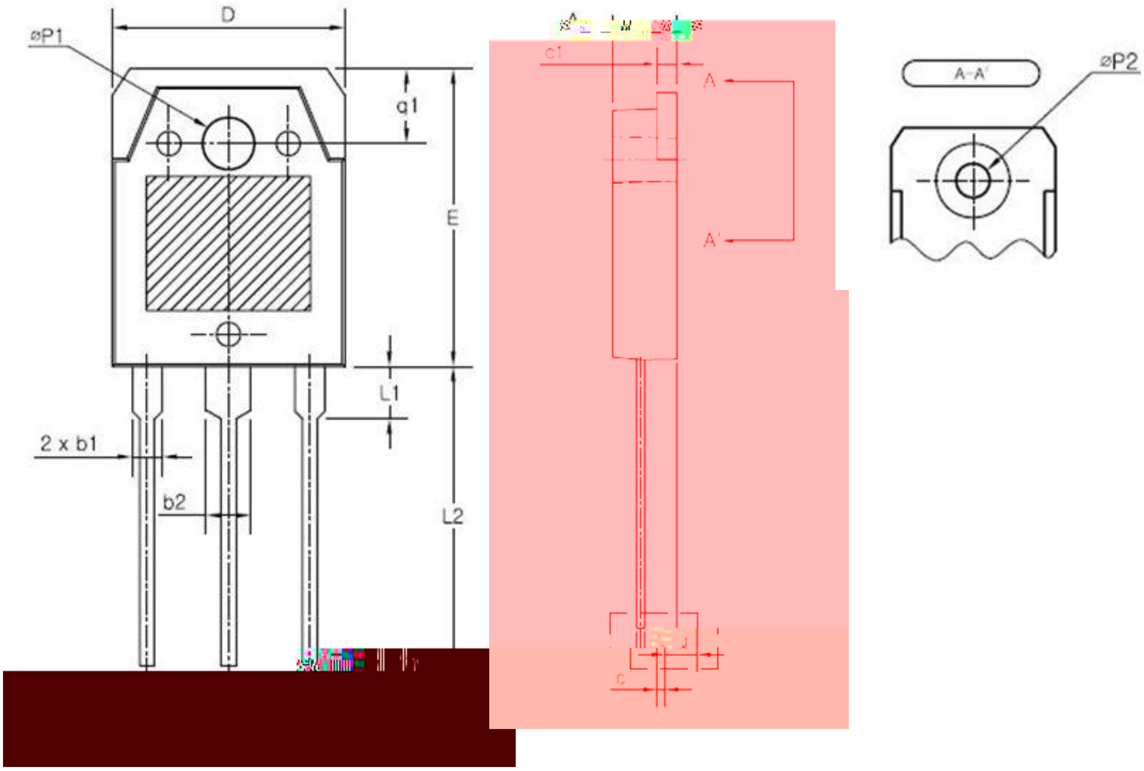


Operation in This Area
is Limited by R DS(on)
Drain Current, I_D [A]
10^2
10^1
10^0
10^-1
10^-2
10 us
100 us
1 ms
10 ms
100 ms
DC
T_C = 25 °C
T_J = 150 °C
Single Pulse
10^0
10^1
10^2
10^3
Drain-Source Voltage, V_DS [V]



Transient thermal impedance
Z_thJC(t)
10^-1
10^-2
Duty=0.5
0.2
0.1
0.05
0.02
0.01
single pulse
P_DM
t
T
Duty = t/T
Z_thJC(t) = 0.4 /W Max.
10^-5
10^-4
10^-3
10^-2
10^-1
10^0
10^1
Pulse Width, t [sec]

TO-3PN MECHANICAL DATA



SYMBOL	MIN	NOM	MAX
A	4.60	4.80	5.00
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	20.00	20.20
øP1	3.30	3.40	3.50
[illegible]	[illegible]	[illegible]	[illegible]