

TGD N-Channel Enhancement Mode Power MOSFET

General Description

The TGD7580 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

Features

- $V_{DS}=75V$; $I_D=80A@V_{GS}=10V$;
 $R_{DS(ON)}<8m\Omega @ V_{GS}=10V$
- Special process technology for high ESD capability
- Special designed for converters and power controls
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

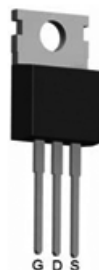
Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

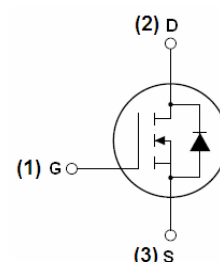
Product Summary

BV_{DSS}	typ.	84	V
$R_{DS(ON)}$	typ.	6.5	m Ω
	max.	8.0	m Ω
I_D		80	A

100% UIS TESTED!



TO-220-3L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
TGD7580	7580	TO-220-3L	-	-	-

Table 1. Absolute Maximum Ratings ($T_C=25^{\circ}C$)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	75	V
Gate-Source Voltage ($V_{DS}=0V$)	V_{GS}	± 25	V
Drain Current (DC) at $T_C=25^{\circ}C$	$I_{D(DC)}$	80	A
Drain Current (DC) at $T_C=100^{\circ}C$	$I_{D(DC)}$	60	A
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_{DM(pluse)}$	320	A
Peak diode recovery voltage	dv/dt	30	V/ns
Maximum Power Dissipation($T_C=25^{\circ}C$)	P_D	170	W
Derating factor		1.13	W/ $^{\circ}C$
Single pulse avalanche energy (Note 2)	E_{AS}	580	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^{\circ}C$

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

2.EAS condition : $T_J=25^{\circ}C, V_{DD}=50V, V_G=10V, L=0.3mH, I_D=62A$;

**Table 2. Thermal Characteristic**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	0.88	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	63	$^{\circ}C/W$

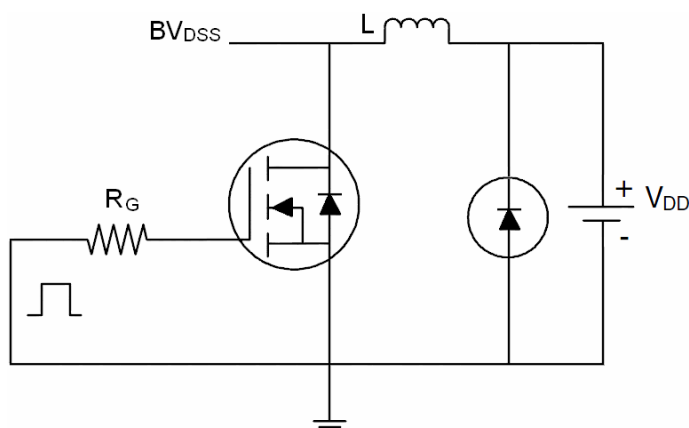
Table 3. Electrical Characteristics ($T_C=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	75	84		V
Zero Gate Voltage Drain Current(Tc=25℃)	I _{DSS}	V _{DS} =75V,V _{GS} =0V			1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I _{DSS}	V _{DS} =75V,V _{GS} =0V			10	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2	2.85	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A		6.5	8	mΩ
Dynamic Characteristics						
Forward Transconductance	g _{FS}	V _{DS} =10V,I _D =40A	20	-	-	S
Input Capacitance	C _{iss}	V _{DS} =25V,V _{GS} =0V, F=1.0MHz		4400		PF
Output Capacitance	C _{oss}			340		PF
Reverse Transfer Capacitance	C _{rss}			260		PF
Total Gate Charge	Q _g	V _{DS} =30V,I _D =30A, V _{GS} =10V		100		nC
Gate-Source Charge	Q _{gs}			20		nC
Gate-Drain Charge	Q _{gd}			30		nC
Switching times						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V,I _D =2A,R _L =15Ω V _{GS} =10V,R _G =2.5Ω		17.8		nS
Turn-on Rise Time	t _r			11.8		nS
Turn-Off Delay Time	t _{d(off)}			56		nS
Turn-Off Fall Time	t _f			14.6		nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I _{SD}				80	A
Pulsed Source-drain current(Body Diode)	I _{SDM}				320	A
Forward on voltage ^(Note 1)	V _{SD}	Tj=25℃,I _{SD} =40A,V _{GS} =0V			1.2	V
Reverse Recovery Time ^(Note 1)	t _{rr}	Tj=25℃,I _F =75A,di/dt=100A/μs			36	nS
Reverse Recovery Charge ^(Note 1)	Q _{rr}				56	nC
Forward Turn-on Time	t _{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L _S +L _D)				

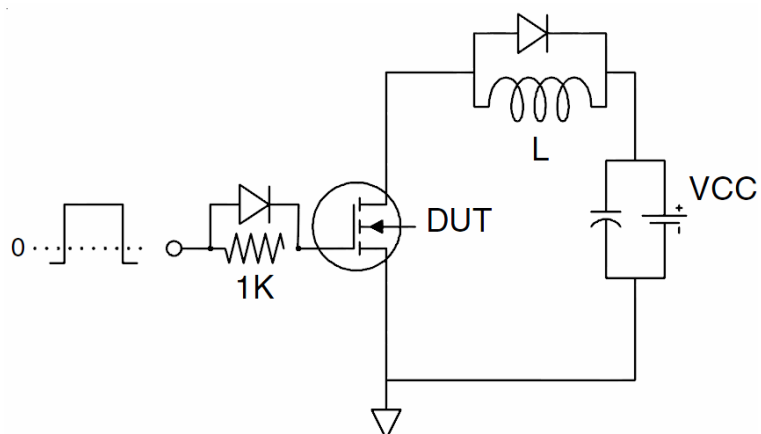
Notes 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1.5\%$, $R_G=25\Omega$, Starting $T_J=25^{\circ}C$

Test Circuit

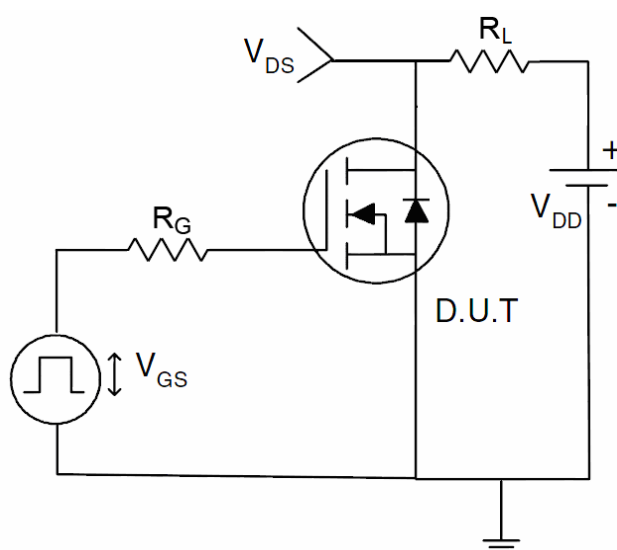
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (curves)

Figure1. Safe operating area

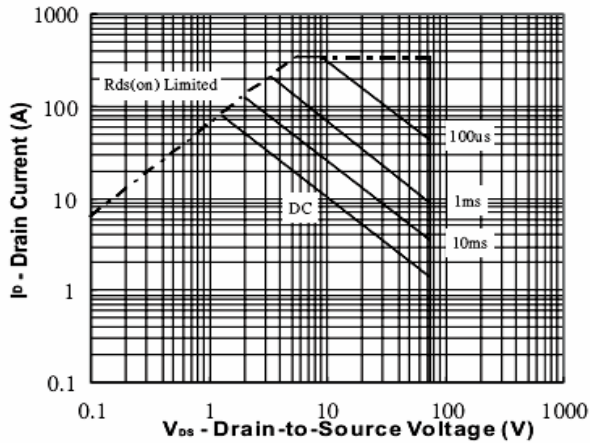


Figure2. Source-Drain Diode Forward Voltage

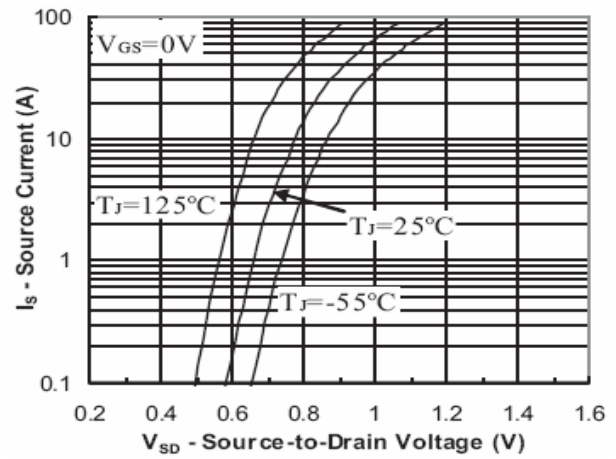


Figure3. Output characteristics

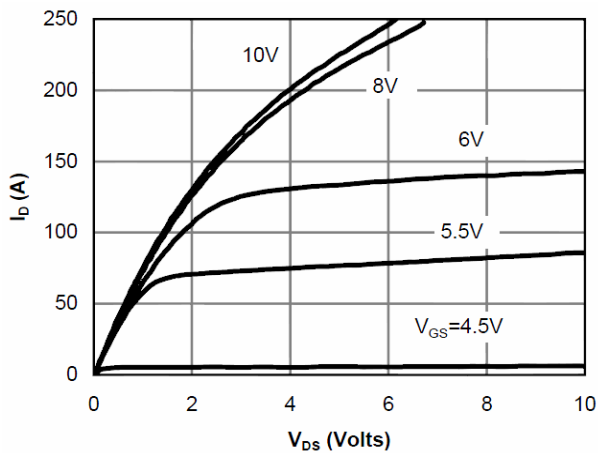


Figure4. Transfer characteristics

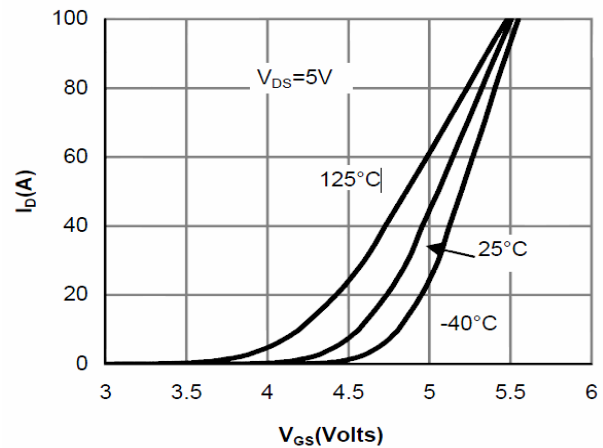


Figure5. Static drain-source on resistance

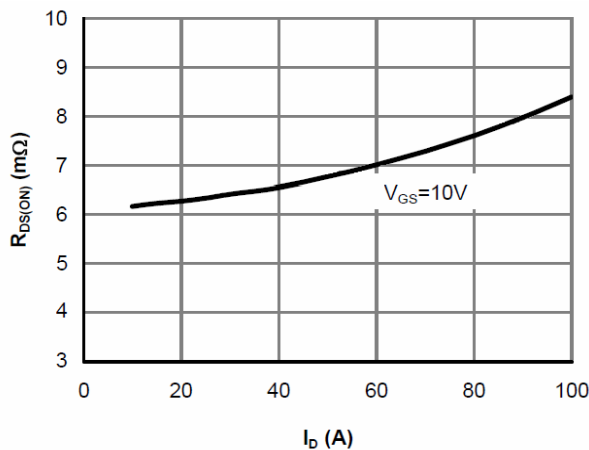


Figure6. $R_{DS(ON)}$ vs Junction Temperature

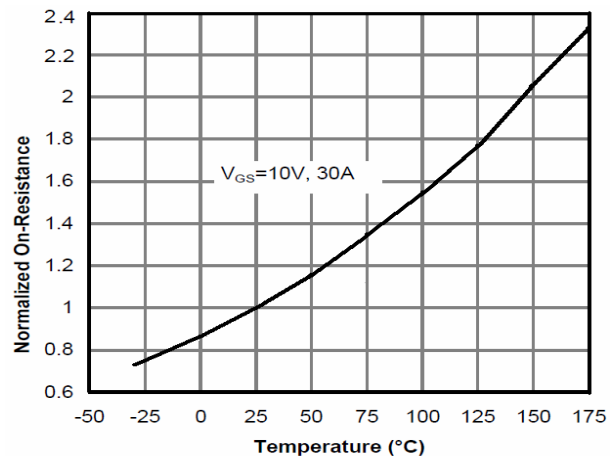


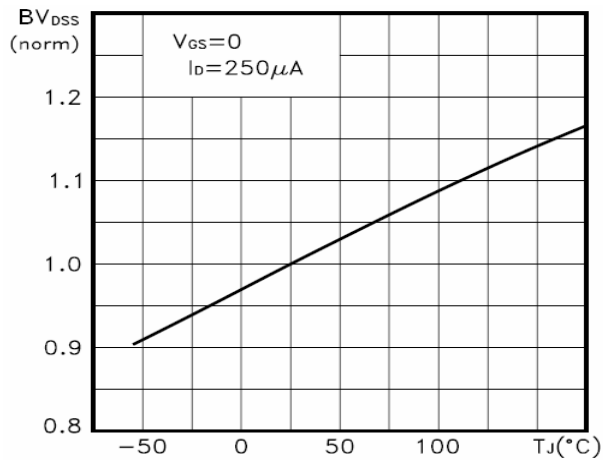
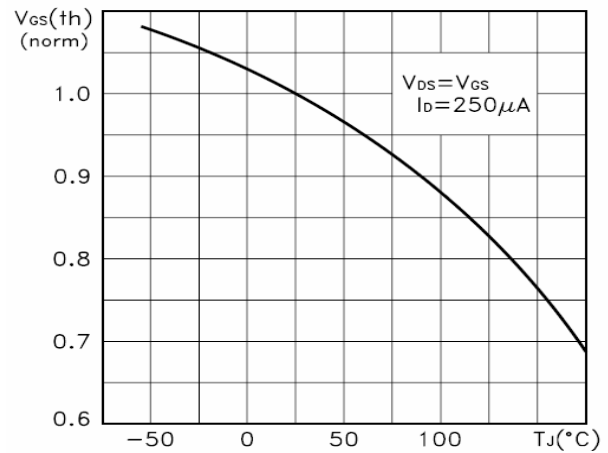
Figure7. BV_{DSS} vs Junction Temperature

Figure8. $V_{GS(th)}$ vs Junction Temperature


Figure9. Gate charge waveforms

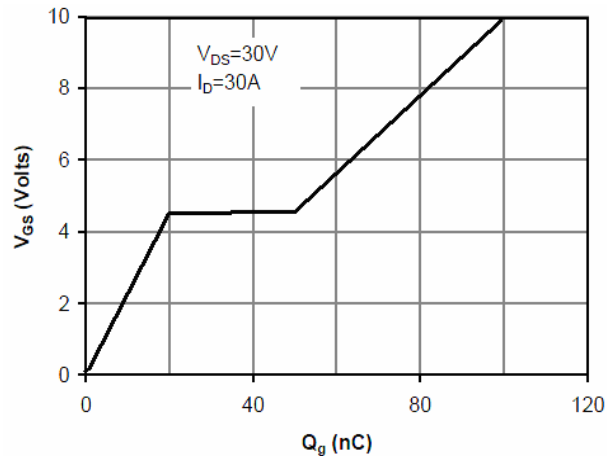
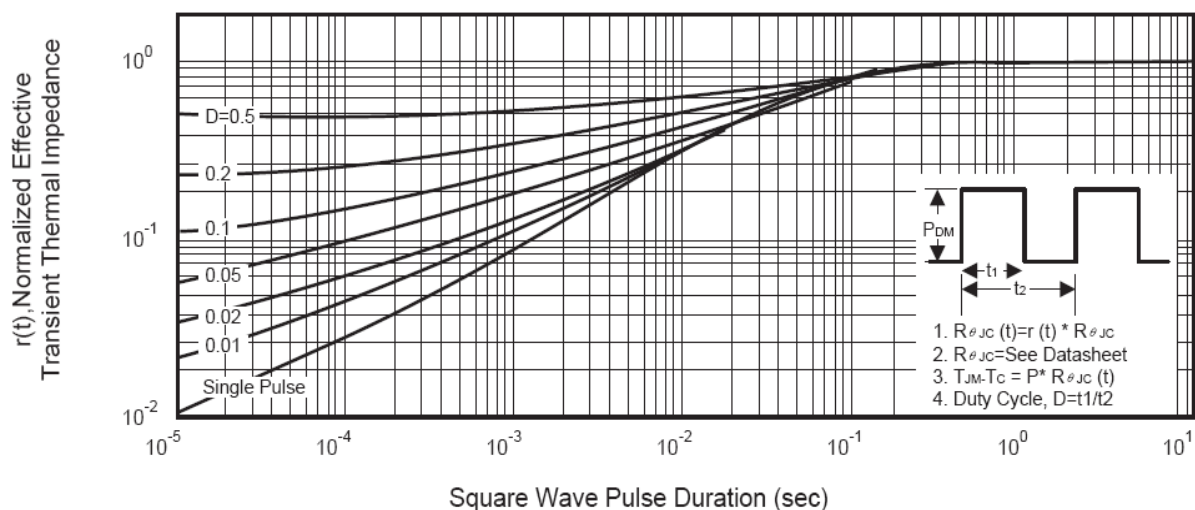
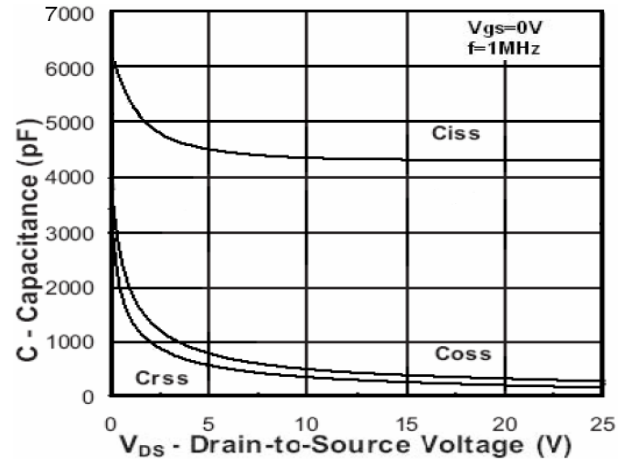
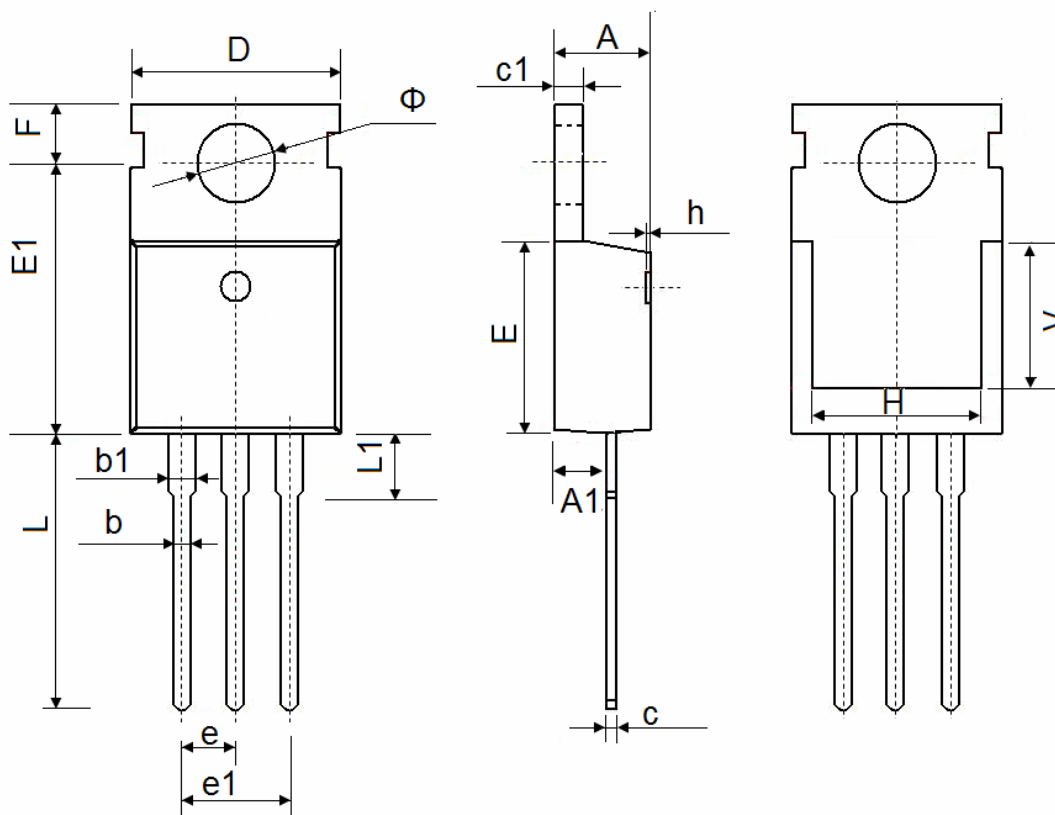


Figure10. Capacitance



TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150