



## 40V/320A N-Channel Power MOSFET

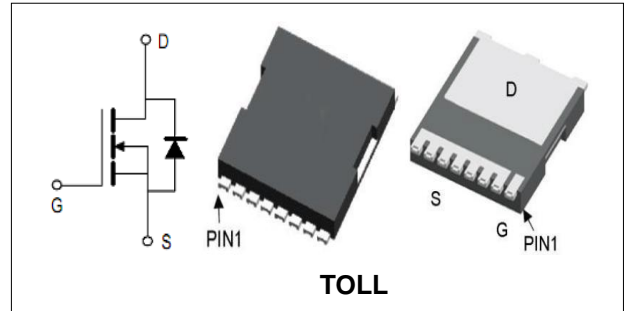
### Features

- New technology for high voltage device.
- Low on-resistance and low conduction losses
- Ultra Low Gate Charge cause lower driving requirements
- 100% Avalanche Tested

BVDSS	40	V
ID	320	A
RDSON@VGS=10V	0.97	mΩ
RDSON@VGS=4.5V	1.3	mΩ

### Applications

- DC/DC Converter
- Motor control and drives
- Battery management



### Order Information

Product	Package	Marking	Reel Size	Reel	Carton
PGT04N012M	TOLL	PGT04N012M	13inch	1500PCS	12000PCS

### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
<b>Common Ratings (TC=25°C Unless Otherwise Noted)</b>				
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	40	V	
$V_{GS}$	Gate-Source Voltage	±20	V	
$T_J$	Maximum Junction Temperature	150	°C	
$T_{STG}$	Storage Temperature Range	-55 to 150	°C	
$I_S$	Diode Continuous Forward Current	TC =25°C	280	A
<b>Mounted on Large Heat Sink</b>				
$E_{AS}$	Single Pulse Avalanche Energy (Note1)	410	mJ	
$I_{DM}$	Pulse Drain Current Tested (Silicon Limit) (Note2)	TC =25°C	1200	A
$I_D$	Continuous Drain current	TC =25°C	320	A
$P_D$	Maximum Power Dissipation	TC =25°C	260	W
$R_{θJC}$	Thermal Resistance Junction-to-Case (Note3)	0.48	°C/W	

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Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
V <sub>(BR)DSS</sub>	Drain- Source Breakdown Voltage	VGS=0V ID=250μA	40	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain current	VDS=40V,VGS=0V	--	--	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
V <sub>GS(TH)</sub>	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.2	1.7	2.5	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance (Note4)	VGS=10V, ID=75A	--	0.97	1.2	mΩ
		VGS=4.5V, ID=20A	--	1.3	2	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated) (Note5)</b>						
C <sub>iss</sub>	Input Capacitance	VDS=25V, VGS=0V, F=300kHz	--	6280	--	pF
C <sub>oss</sub>	Output Capacitance		--	1610	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	70	--	pF
Q <sub>g</sub>	Total Gate Charge	VDS=20V, ID=50A, VGS=10V	--	98	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	32	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	20	--	nC
<b>Switching Characteristics (Note5)</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	VDS=20V, ID=50A RG=1.6Ω, VGS=10V	--	16	--	nS
t <sub>r</sub>	Turn-on Rise Time		--	8.6	--	nS
t <sub>d(off)</sub>	Turn-off Delay Time		--	62	--	nS
t <sub>f</sub>	Turn-off Fall Time		--	11	--	nS
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
V <sub>SD</sub>	Forward on voltage	ISD=75A,VGS=0V	--	--	1.2	V

Note:

- Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25° C, R<sub>G</sub> = 25Ω, V<sub>D</sub> = 30V, V<sub>GS</sub> = 10V. Part not recommended for use above this value.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Pulse Test: pulse width ≤ 300 us, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.



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Typical Characteristics

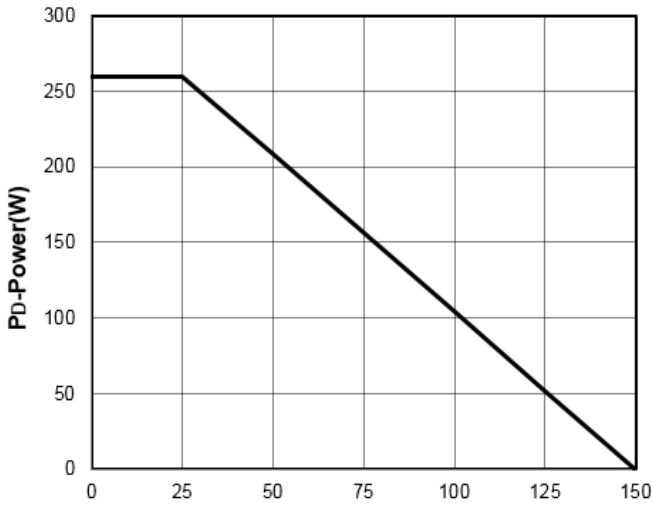


Figure1: T<sub>J</sub>- Junction Temperature (°C)

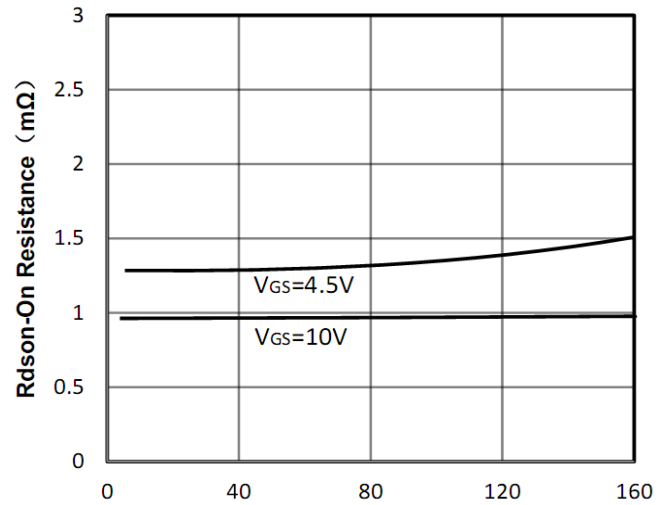


Figure2: I<sub>D</sub>- Drain Current (A)

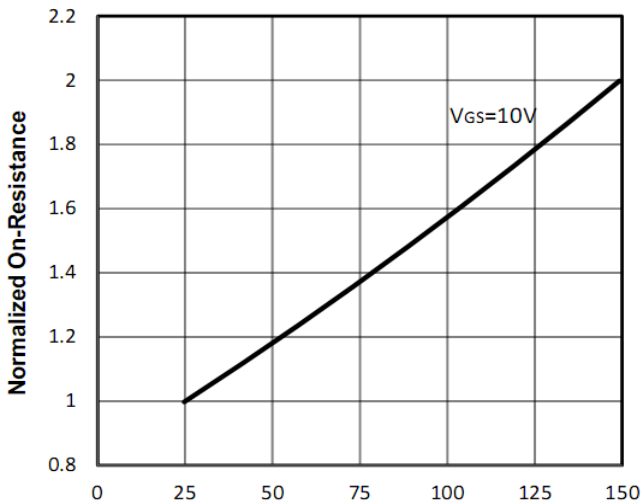


Figure3: T<sub>J</sub>- Junction Temperature (°C)

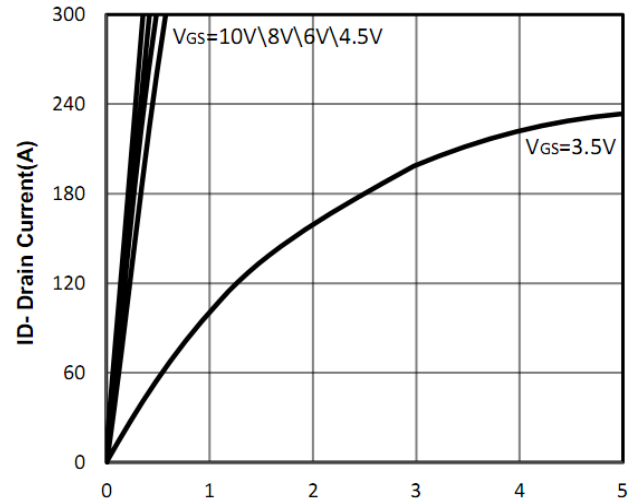


Figure4: V<sub>DS</sub>- Drain-Source Voltage (V)

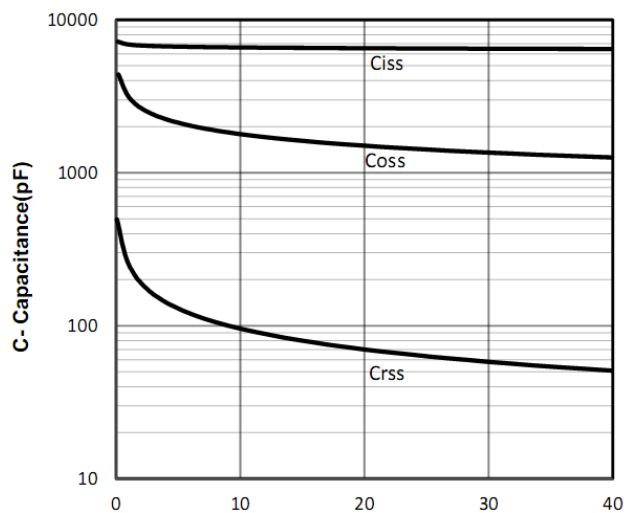


Figure5: V<sub>DS</sub>- Drain-Source Voltage (V)

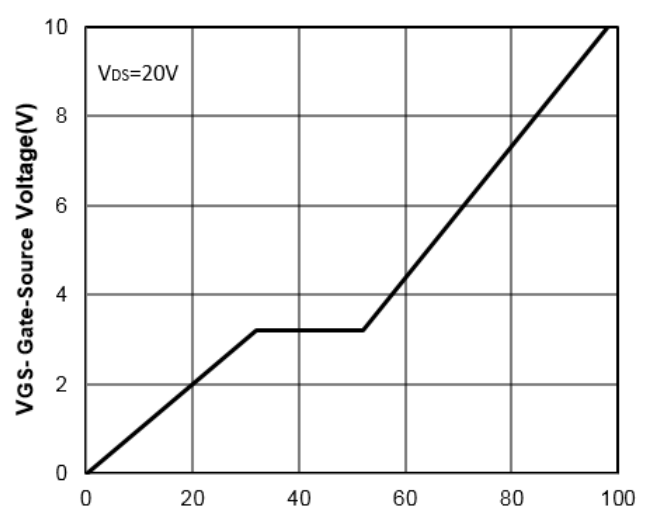


Figure6: Q<sub>G</sub>- Gate Charge (nC)



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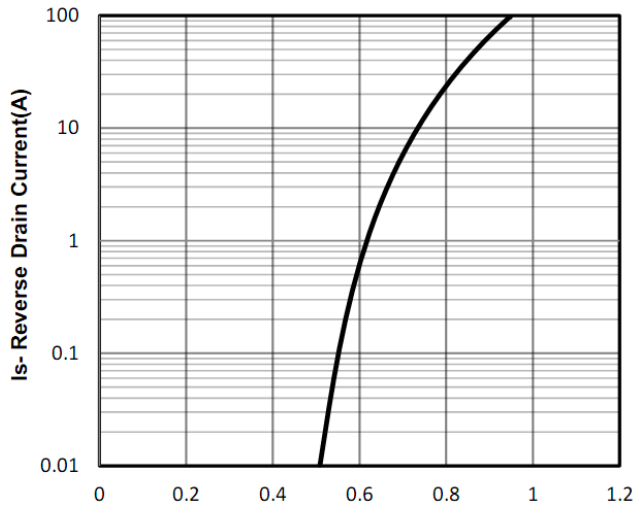


Figure7: Vsd- Source-Drain Voltage (V)

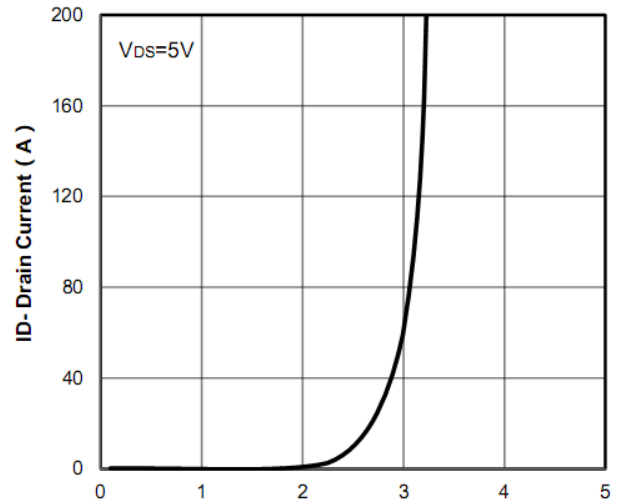


Figure8: Vgs- Gate-Source Voltage (V)

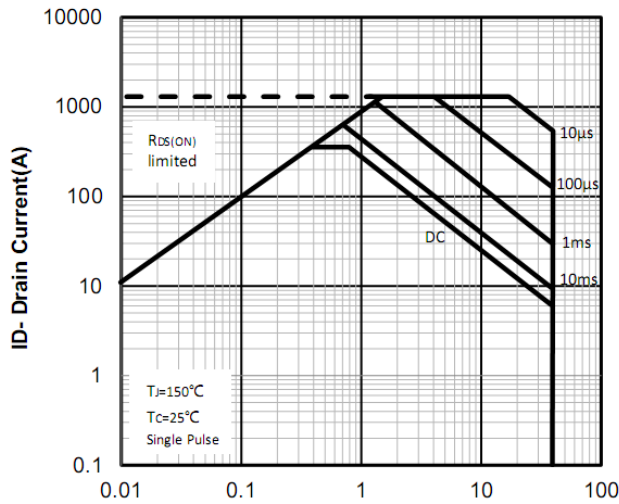


Figure9: Vds- Drain -Source Voltage (V)

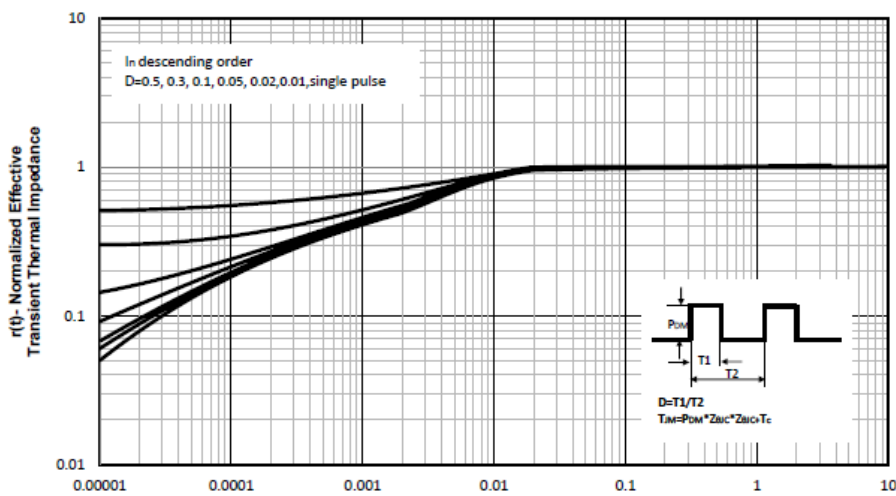


Figure10: Square Wave Pulse Duration (sec)

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### Test Circuit and Waveform:

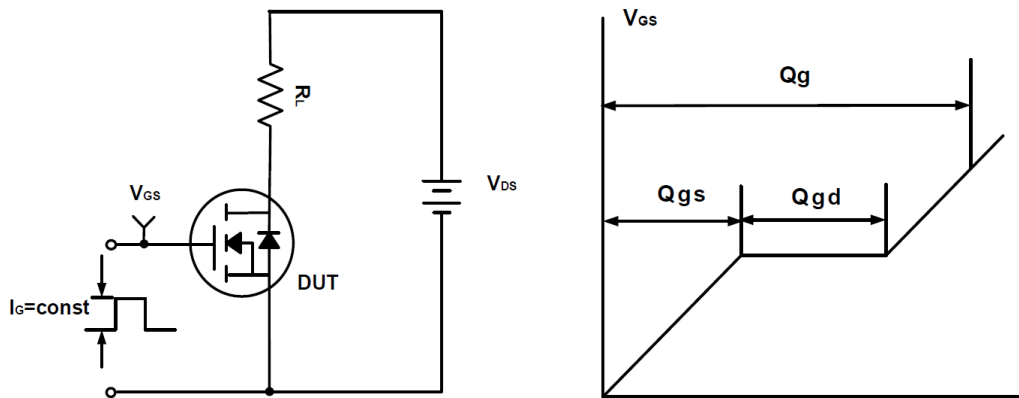


Figure A Gate Charge Test Circuit & Waveforms

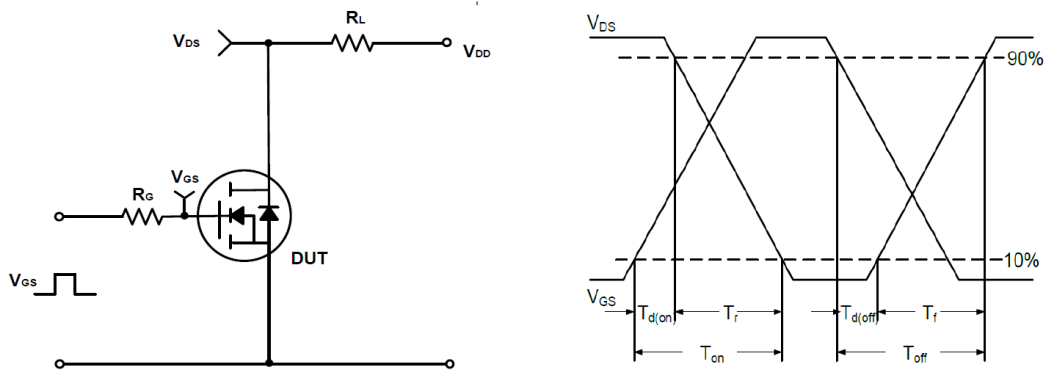


Figure B Switching Test Circuit & Waveforms

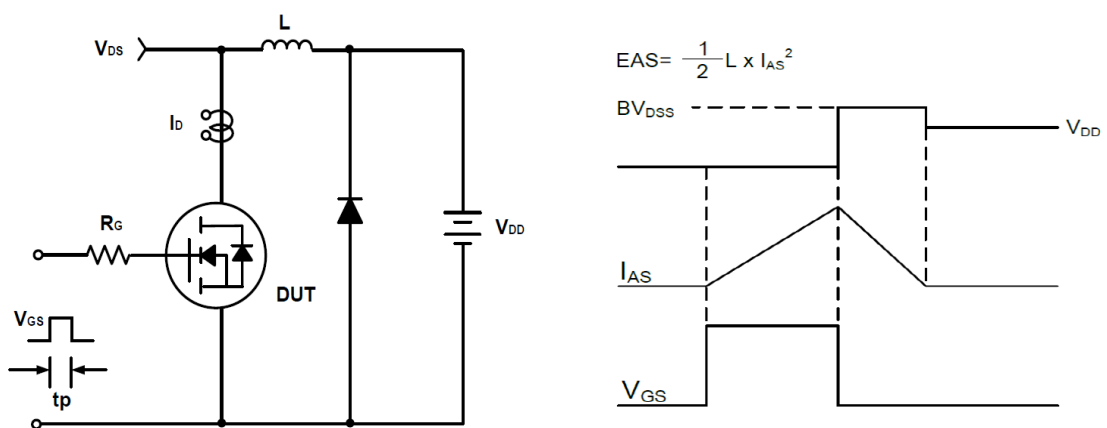
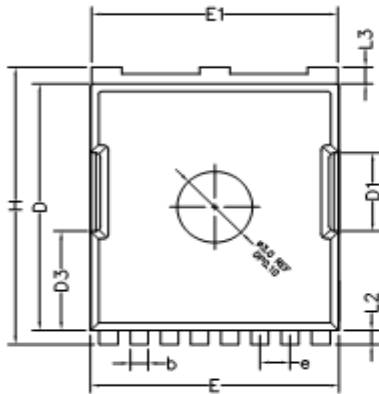


Figure C Unclamped Inductive Switching Circuit & Waveforms

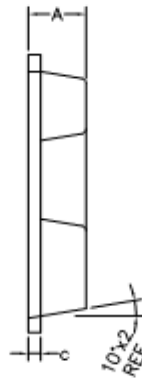


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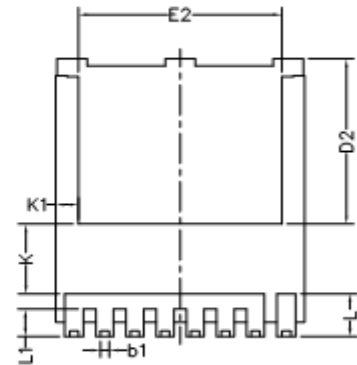
TOLL Package Outline Dimensions (Units: mm)



TOP VIEW



SIDE VIEW



BOTTEM VIEW



SIDE VIEW

COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A	2.200	2.300	2.400
b	0.600	0.700	0.900
b1	0.300	—	0.500
c	0.400	0.500	0.600
D	10.280	10.380	10.480
D1	3.200	3.300	3.400
D2	6.850	6.950	7.050
D3	4.18REF		
E	9.800	9.900	10.000
E1	9.700	9.800	9.900
E2	8.000	8.100	8.200
e	1.200BSC		
H	11.480	11.680	11.880
L	1.600	1.800	2.100
L1	1.000	1.150	1.300
L2	0.600 TYPE		
L3	0.600 TYPE		
K	2.900 TYPE		
K1	0.900 TYPE		