N-CHANNEL ENHANCEMENT MODE POWER MOSFET

TF015N04TG

Features

- Vds = 40V , Id = 255A
  $R_{DS(ON)}$=1.2mΩ (typ.) @ V_{GS}=10V
  $R_{DS(ON)}$=1.9mΩ (typ.) @ V_{GS}=4.5V
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance
- Wettable Flanks

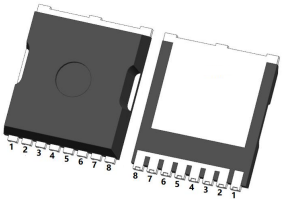
Application

- BLDC Motor driver
- SMPS 2nd Synchronous Rectifier
- DC-DC Converter

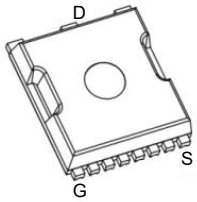
RoHS compliant

Package

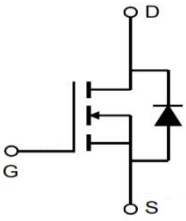
Top View



Top View



Schematic diagram



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
TF015N04TG	TF015N04TG	TOLL-8	-	-	-

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	255	A
	T_C=100°C		178	
Pulsed Drain Current[1]		I_{DM}	640	A
Single Pulse Avalanche Energy[2]		EAS	430	mJ
Total Power Dissipation	T_C=25°C	P_D	180	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C
Thermal Resistance from Junction-to-Ambient[3]		$R_{\theta JA}$	39	°C/W
Thermal Resistance from Junction-to-Case		$R_{\theta JC}$	1.3	°C/W

Electrical Characteristics (T_J = 25°C, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	40	-	-	V
Gate-body Leakage current		I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS} = 36V, V_{GS} = 0V	-	-	1	μA
	T_J=100°C			-	-	100	
Gate-Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.5	2.5	V
Drain-Source on-Resistance[4]		$R_{DS(on)}$	V_{GS} = 10V, I_D = 30A	-	1.20	1.8	mΩ
			V_{GS} = 4.5V, I_D =20A	-	1.90	2.8	
Dynamic Characteristics[5]							
Input Capacitance		C_{iss}	V_{DS} = 20V, V_{GS} =0V, f =1MHz	-	4217	-	pF
Output Capacitance		C_{oss}		-	898	-	
Reverse Transfer Capacitance		C_{rss}		-	838	-	
Gate Resistance		R_g	f=1MHz	-	1.0	-	Ω
Switching Characteristics[5]							
Total Gate Charge		Q_g	V_{GS} = 10V, V_{DS} = 20V, I_D= 30A	-	96.8	-	nC
Gate-Source Charge		Q_{gs}		-	17.8	-	
Gate-Drain Charge		Q_{gd}		-	15.8	-	
Turn-on Delay Time		$t_{d(on)}$	V_{GS} =10V, V_{DD} = 20V, R_G = 3Ω, I_D= 30A	-	23.0	-	ns
Rise Time		t_r		-	8.9	-	
Turn-off Delay Time		$t_{d(off)}$		-	73.5	-	
Fall Time		t_f		-	17.8	-	
Body Diode Reverse Recovery Time		t_{rr}	I_F=30A, di/dt = 100A/μs	-	58.0	-	ns
Body Diode Reverse Recovery Charge		Q_{rr}		-	77.0	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage[4]		V_{SD}	I_S = 30A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current	T_C=25°C	I_S	-	-	-	160	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
2. The EAS data shows Max. rating . The test condition is V_{DD}=20V, V_{GS}=10V, L=0.5mH, I_{AS}=20A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

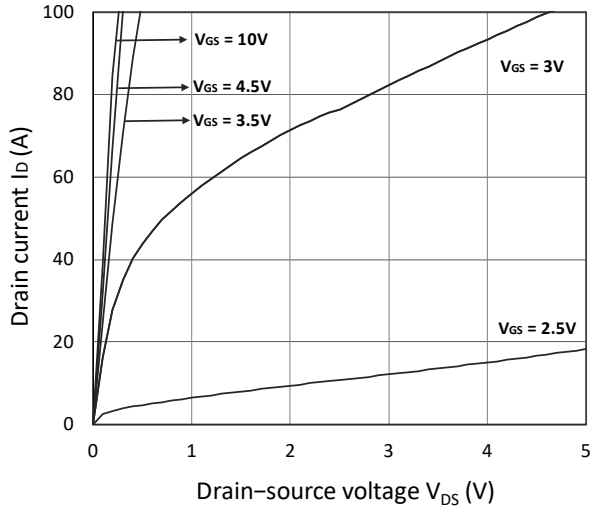


Figure 1. Output Characteristics

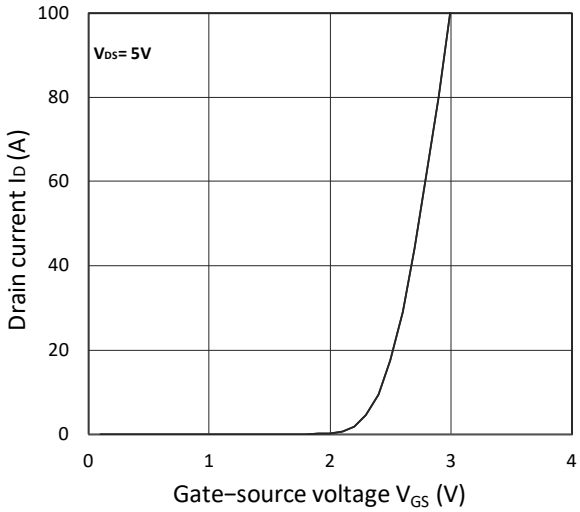


Figure 2. Transfer Characteristics

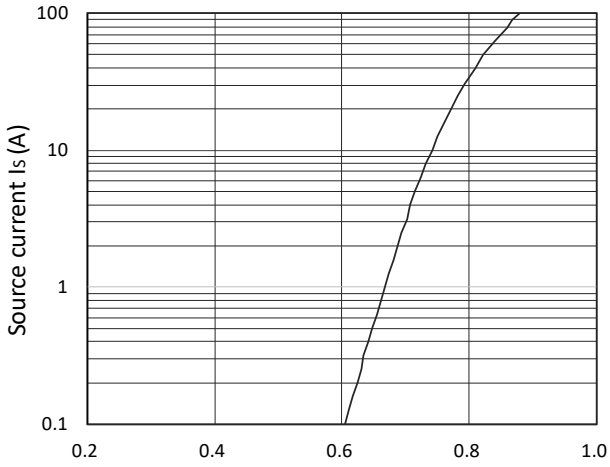


Figure 3. Forward Characteristics of Reverse

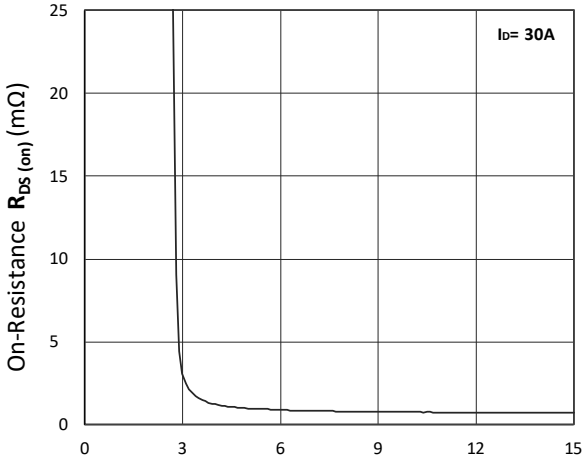


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

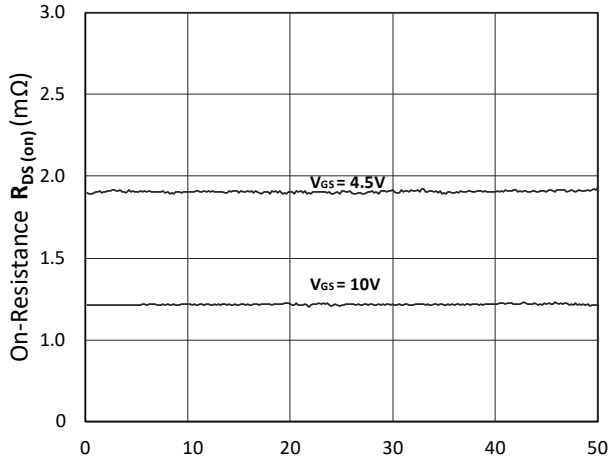


Figure 5. $R_{DS(ON)}$ vs. I_D

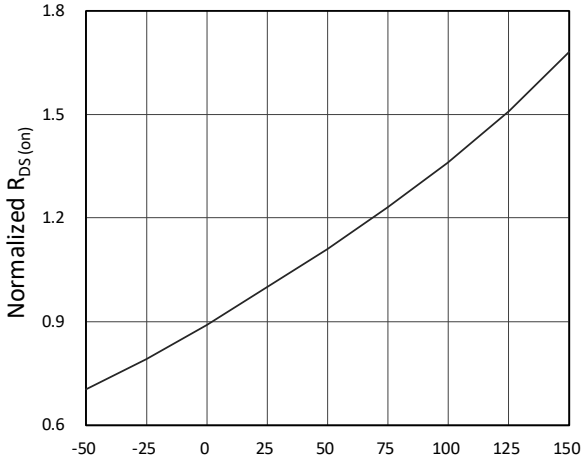


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

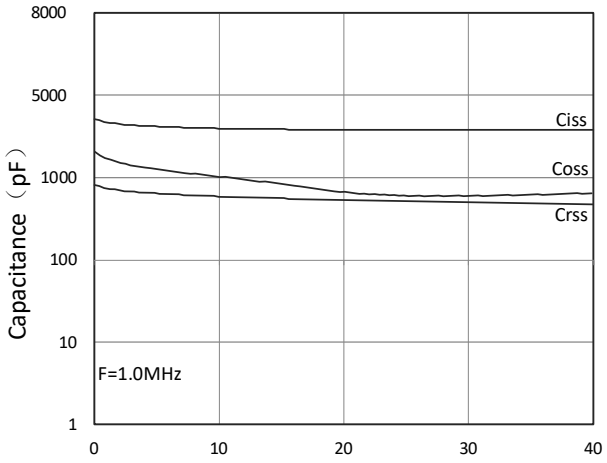


Figure 7. Capacitance Characteristics

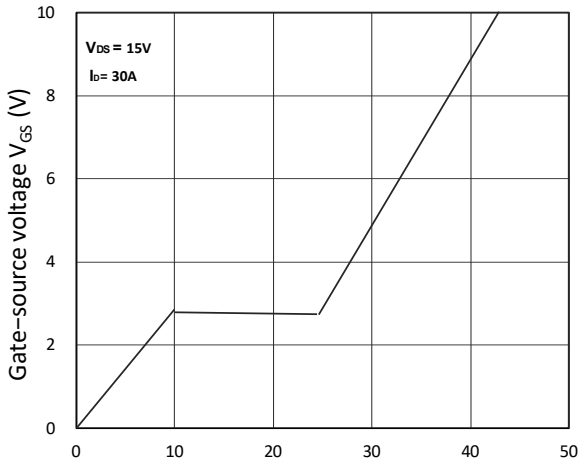


Figure 8. Gate Charge Characteristics

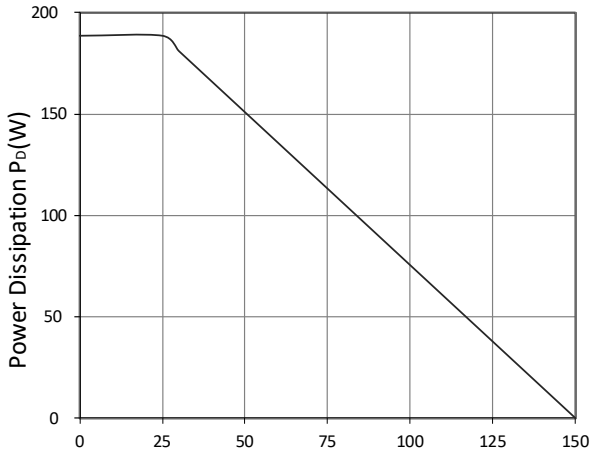


Figure 9. Power Dissipation

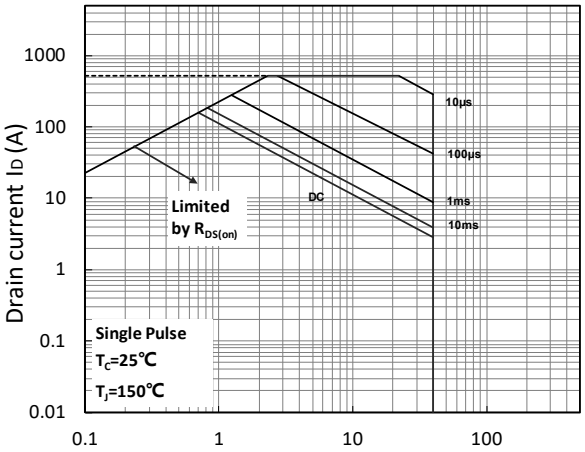


Figure10. Safe Operating Area

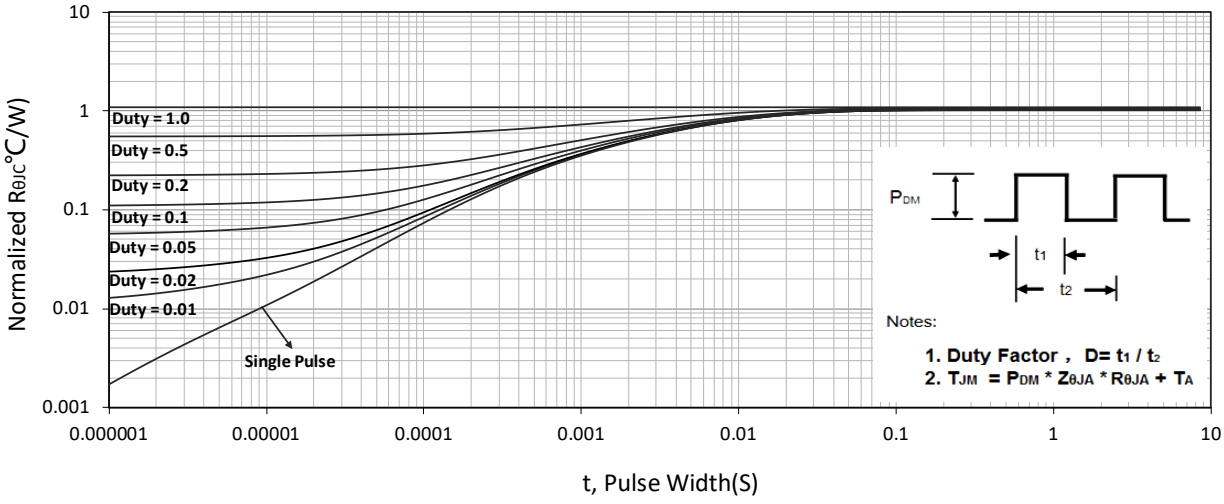


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

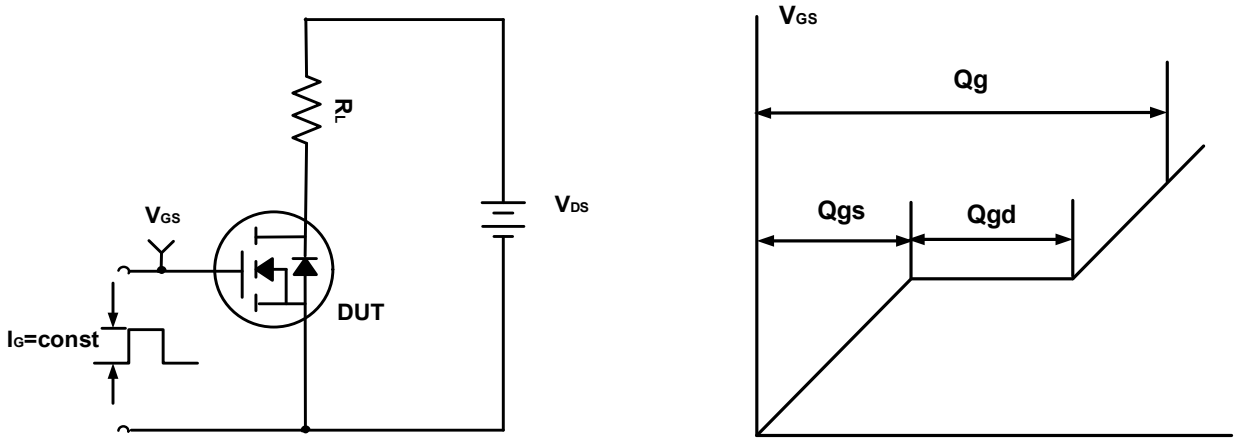


Figure A. Gate Charge Test Circuit & Waveforms

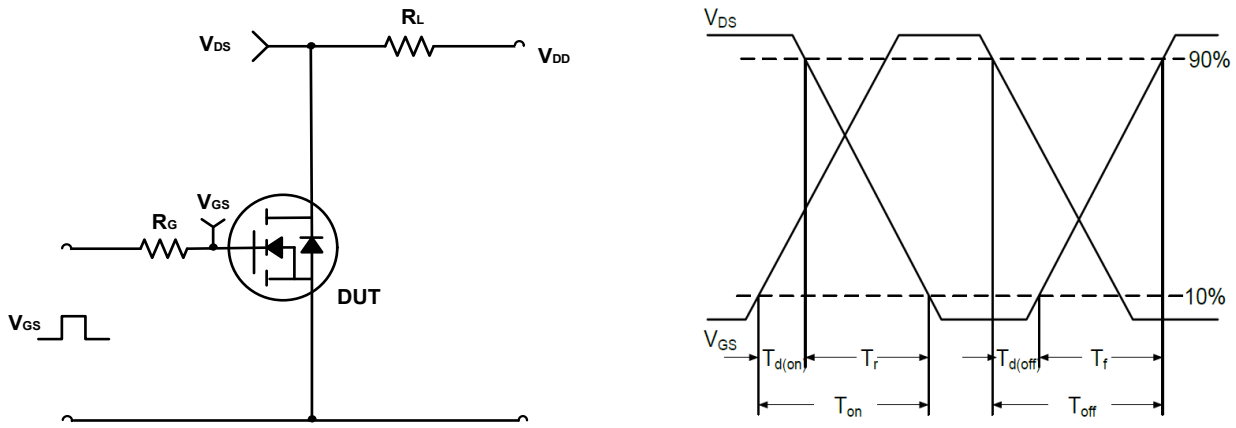


Figure B. Switching Test Circuit & Waveforms

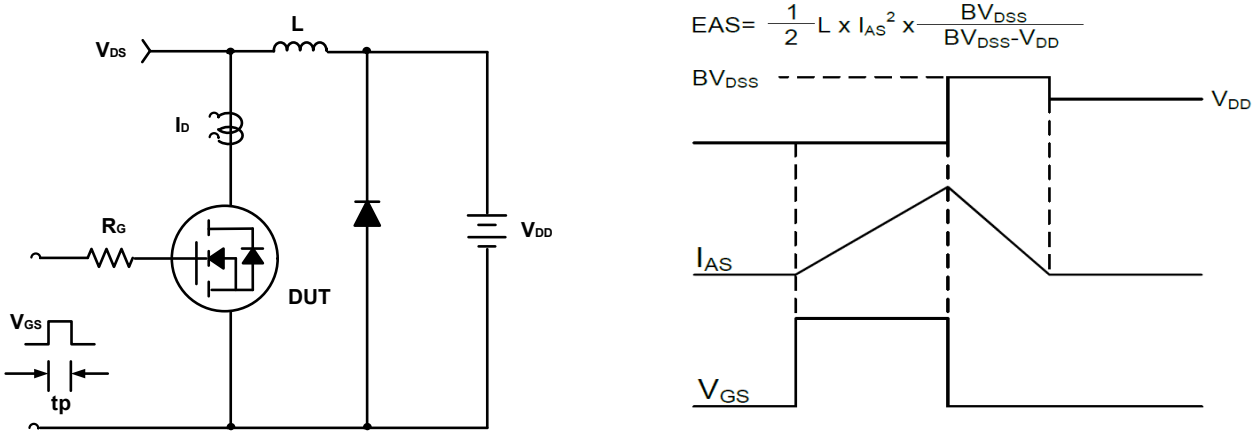
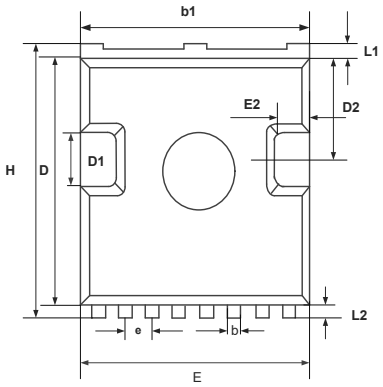
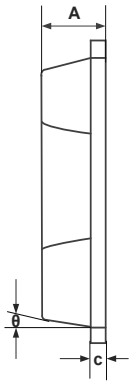


Figure C. Unclamped Inductive Switching Circuit & Waveforms

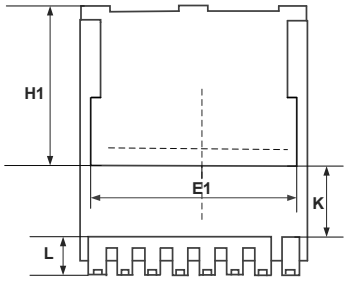
Mechanical Dimensions for TOLL



TOP VIEW



SIDE VIEW



BOTTTOM VIEW

COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	2.20	2.40
b	0.60	0.90
b1	9.70	9.90
c	0.40	0.60
D	10.20	10.60
D1	3.10	3.50
D2	4.45	4.75
E	9.70	10.10
E1	7.80BSC	
E2	0.50	0.70
e	1.200 BSC	
H	11.45	11.90
H1	6.75 BSC	
K	3.10 REF	
L	1.70	2.10
L1	0.60	0.80
L2	0.50	0.70
θ	10° REF	