

Description

N-channel Enhancement Mode Power MOSFET

Features

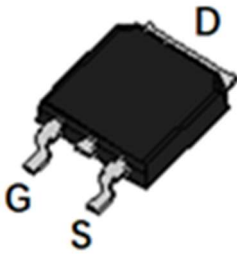
- 30V , 120A
 $R_{DS(on)} = 2.9m\Omega @ V_{GS} = 10V$
 $R_{DS(on)} = 3.9m\Omega @ V_{GS} = 4.5V$
- Advanced Trench Technology
- Provide Excellent $R_{DS(on)}$ and Low Gate Charge
- Lead free product is acquired

Application

- Load Switch
- PWM Application
- Power management



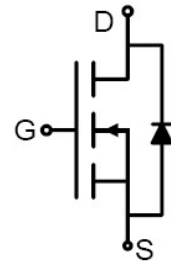
100% UIS TESTED!
100% ΔV_{ds} TESTED!



TO-252(DPAK) top view



Marking and pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
120N03	TF120N03	TAPING	TO-252	13inch	2500	-

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter		Max.	Units
V _{DSS}	Drain-Source Voltage		30	V
V _{GSS}	Gate-Source Voltage		±20	V
I _D	Continuous Drain Current	T _C = 25°C	120	A
		T _C = 100°C	84	A
I _{DM}	Pulsed Drain Current ^{note1}		430	A
E _{AS}	Single Pulsed Avalanche Energy ^{note2}		350	mJ
P _D	Power Dissipation	T _C = 25°C	70	W
R _{θJC}	Thermal Resistance, Junction to Case		2.14	°C/W
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C



Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} = 0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =10V, I _D =30A	-	2.9	3.2	mΩ
		V _{GS} =4.5V, I _D =20A	-	3.9	4.5	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f = 1.0MHz	-	3300	-	pF
C _{oss}	Output Capacitance		-	458	-	pF
C _{rss}	Reverse Transfer Capacitance		-	375	-	pF
Q _g	Total Gate Charge	V _{DS} =15V, I _D =30A, V _{GS} =10V	-	30	-	nC
Q _{gs}	Gate-Source Charge		-	7.2	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	10.4	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =15V, I _D =30A, R _{GEN} =3Ω, V _{GS} =10V	-	23	-	ns
t _r	Turn-on Rise Time		-	28	-	ns
t _{d(off)}	Turn-off Delay Time		-	74	-	ns
t _f	Turn-off Fall Time		-	36	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	100	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	400	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S =30A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A,dI/dt=100A/μs	-	28	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	21	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=20V$, $V_G=10V$, $R_G=25\Omega$, $L=0.5mH$, $I_{AS}=22A$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Figure1: Output Characteristics

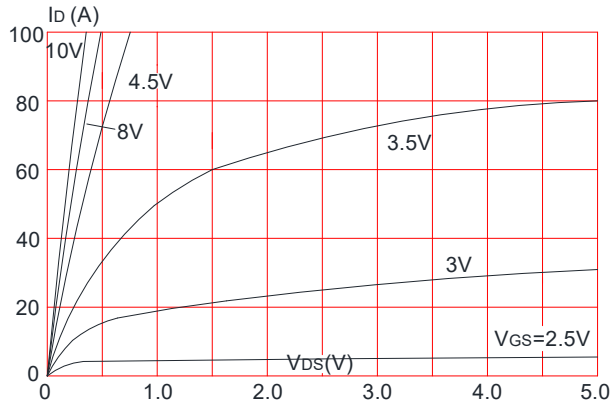


Figure 2: Typical Transfer Characteristics

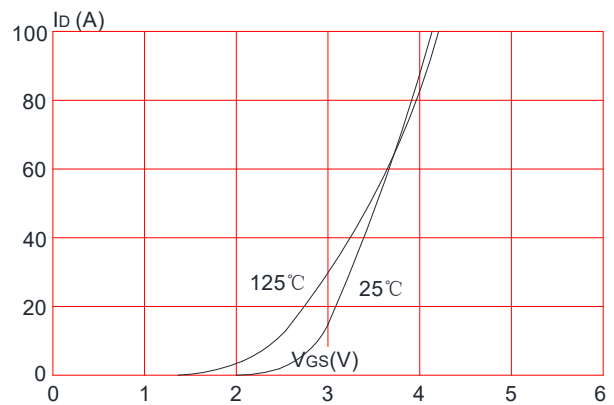


Figure 3: On-resistance vs. Drain Current

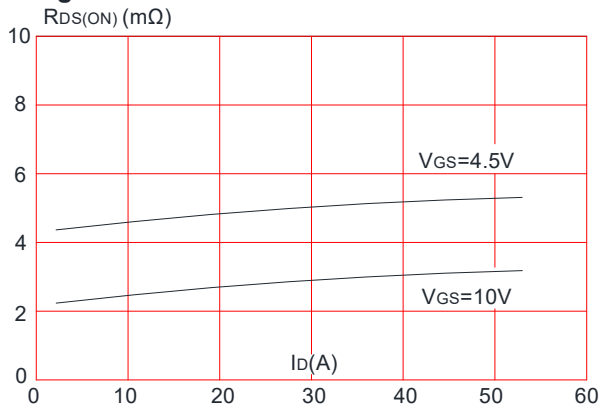


Figure 4: Body Diode Characteristics

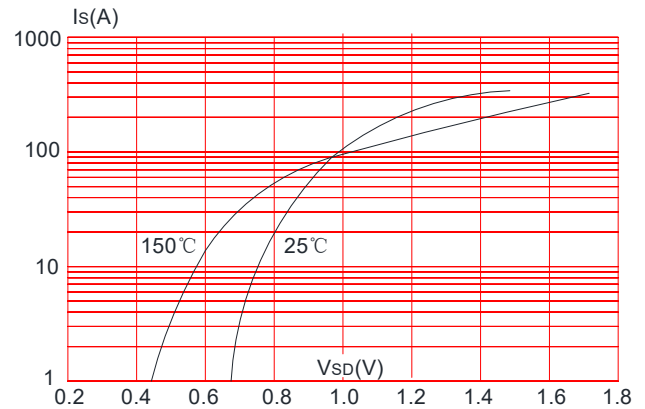


Figure 5: Gate Charge Characteristics

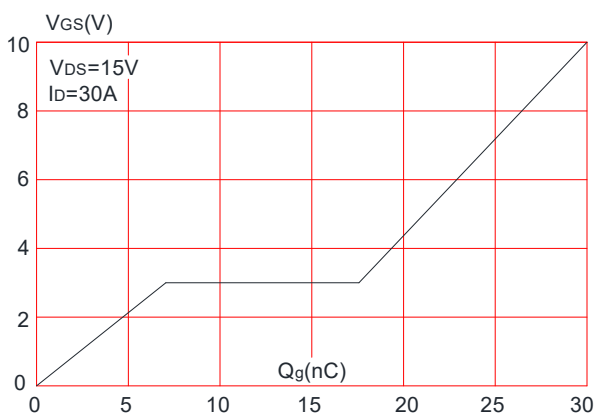


Figure 6: Capacitance Characteristics

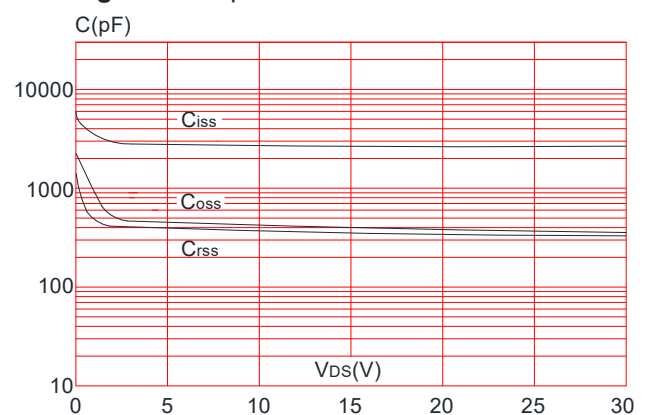


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

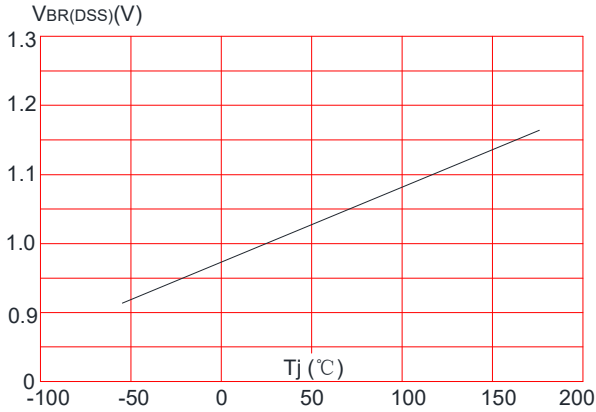


Figure 8: Normalized on Resistance vs. Junction Temperature

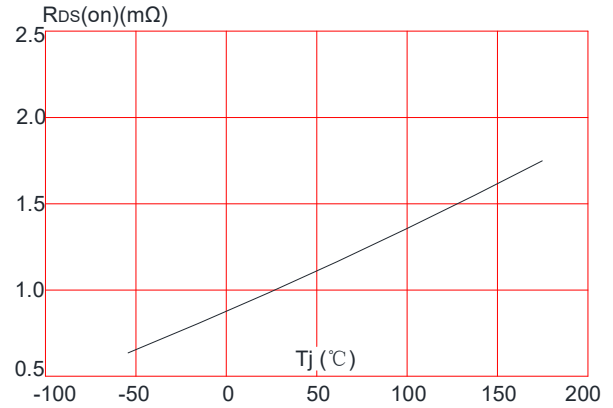


Figure 9: Maximum Safe Operating Area

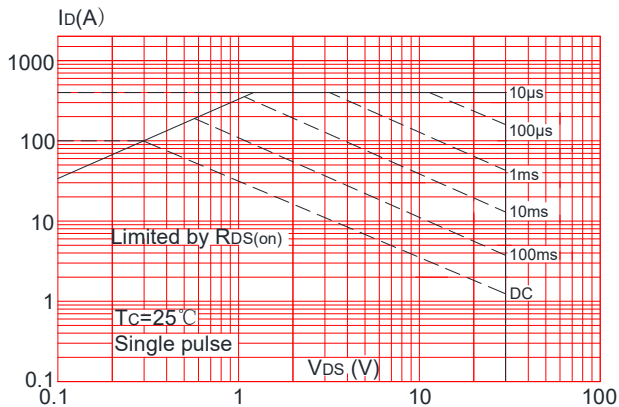


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

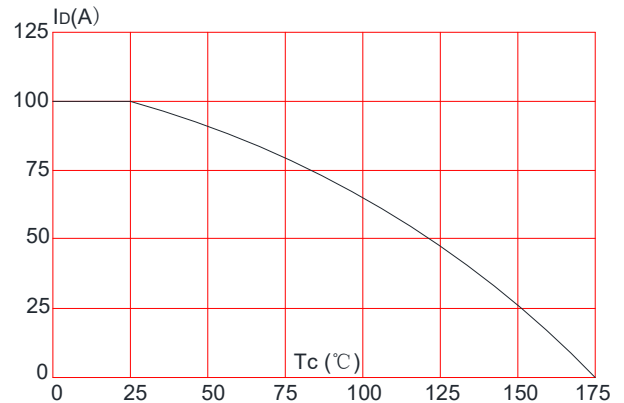
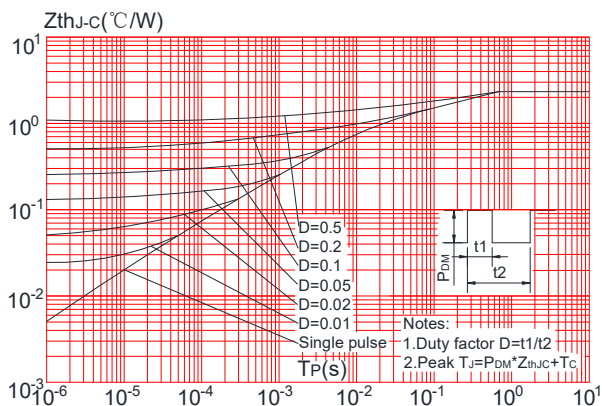


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

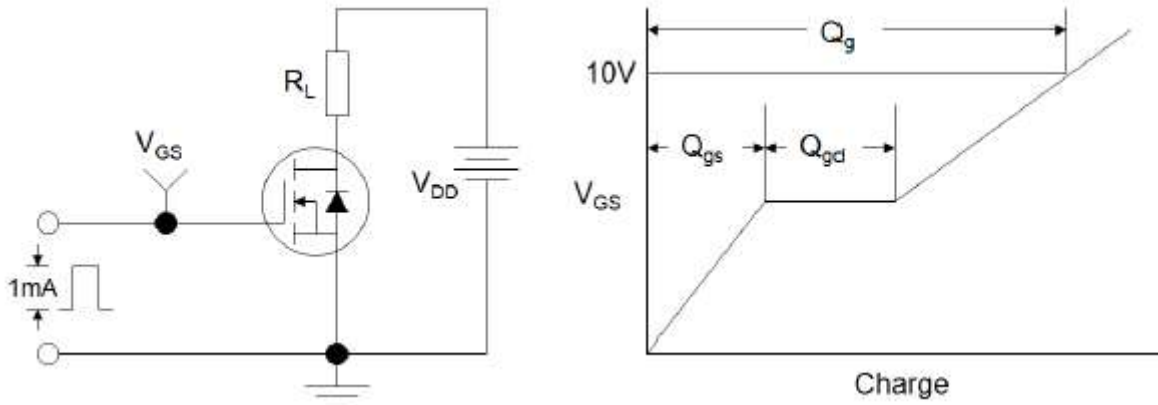


Figure1:Gate Charge Test Circuit & Waveform

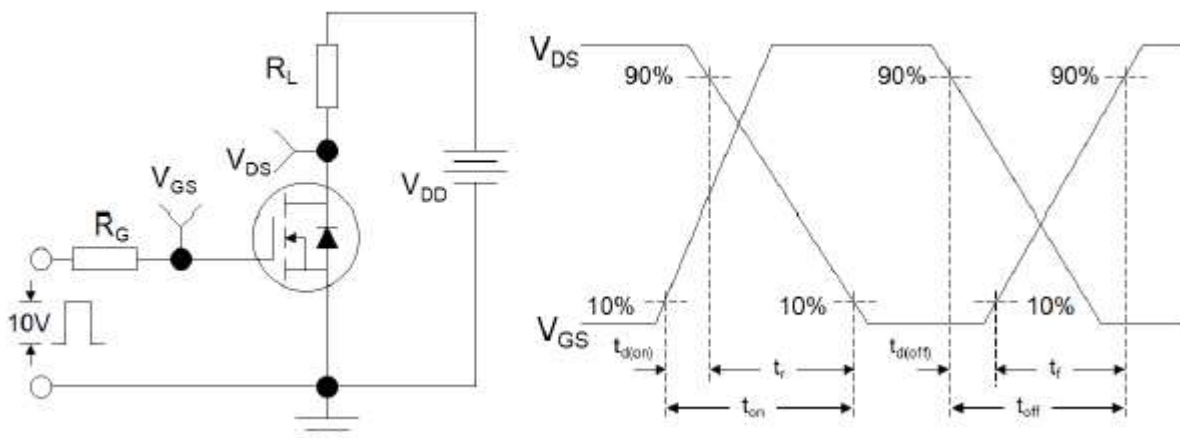


Figure 2: Resistive Switching Test Circuit & Waveforms

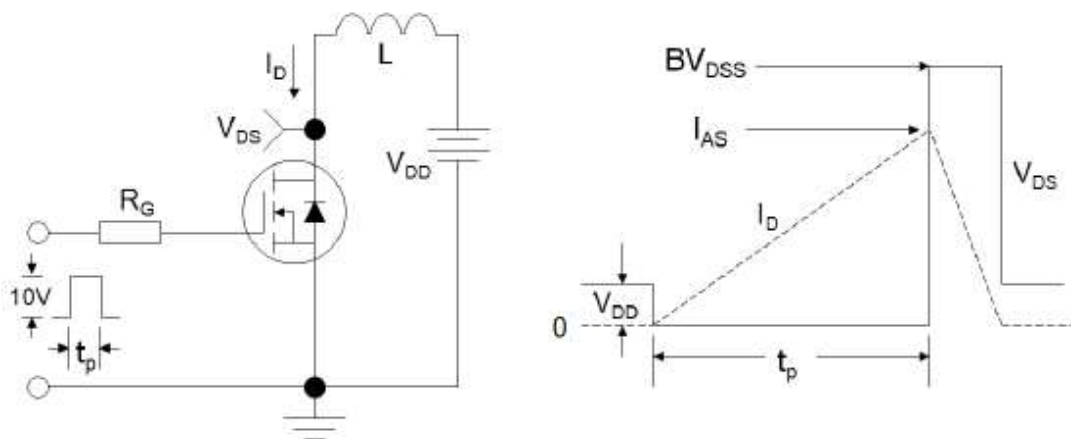
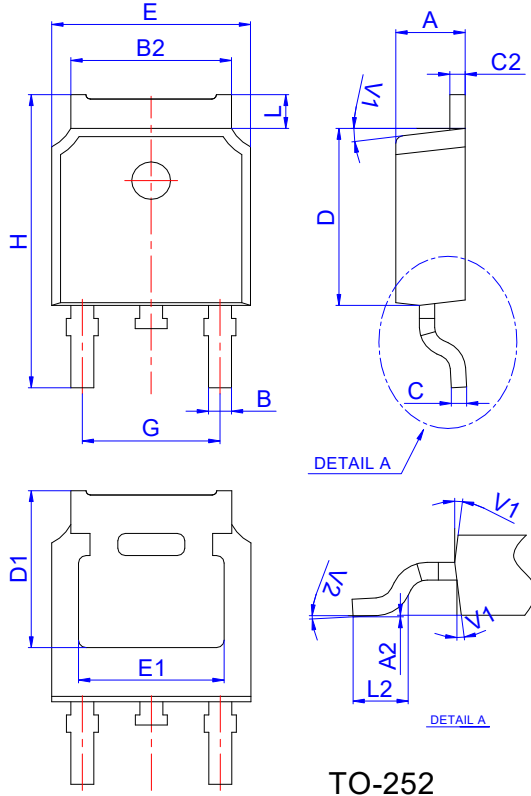


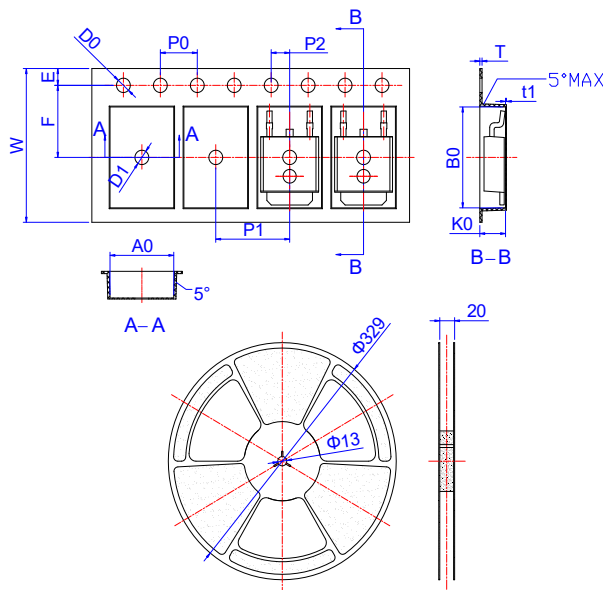
Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Reel Specification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583