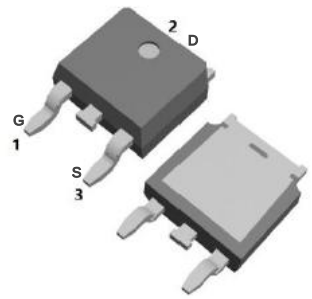
FEATURE

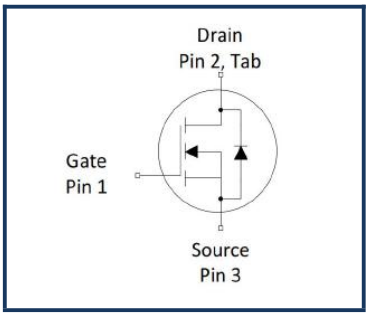
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g x R_{DS(on)}$ product(FOM)
- Excellent Low Ciss
- Qualified according to JEDEC criteria
- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density
- Easy paralleling

TO-252



Application

- Synchronous Rectification for AC/DC Quick Charger
- Battery management
- UPS(Uninterrupible Power Supplies)



Parameter	Values	Unit
Bvdss	100	V
Id	40	A
Rdson(typ)	23	mΩ
VGS(th) (typ)	1.2	V

Ordering Code	Marking	Package	Packaging
TF40N10KG	TF40N10KG	TO-252	Tape & Reel

Absolute Maximum Ratings(T_C=25℃,unless otherwise noted)

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Drain-Source Voltage	V_{DSS}	100	-	-	V	-
Gate-Source Voltage	V_{GS}	-20	-	20	V	-
Continuous Drain Current	I_D	-	-	40	A	T_C=25℃ (Silicon limit)
		-	-	55		T_C=25℃ (Package limit)
		-	-	25		T_C=100℃ (Silicon limit)
		-	-	5		T_a=25℃
Pulsed Drain Current(Note1)	I_{DM}	-	-	120	A	T_C = 25°C, t_p =100uS
Single Pulse Avalanche Energy	E_{AS}	-	-	50	mJ	L=0.5mH,V_D=50V, T_C=25℃
Power Dissipation	P_D	-	-	25	W	T_C=25℃
		-	-	1.1		T_a=25℃
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55	-	150	℃	-
Maximum lead temperature for soldering purposes, 1/8"from case for 5 seconds	T_L	-	-	260	℃	-

Thermal Characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Thermal resistance , junction – case	R_{thJC}	-	8.9	-	℃/W	-
Thermal resistance ,junction - ambient(min.footprint)	R_{thJA}	-	-	110		-

Electrical Characteristics (T_C=25℃,unless otherwise noted)

Static characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Drain-Source Breakdown Voltage	BV_{DSS}	100	-	-	V	V_{GS}=0V,I_D=250μA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	1	μA	V_{DS}=100V,V_{GS}=0V,Tj=25°C
		-	-	100		V_{DS}=100V,V_{GS}=0V,Tj=150°C
Gate-Body Leakage Current	I_{GSS}	-	-	±100	nA	V_{GS}=±20V,V_{DS}=0V
Gate-Source Threshold Voltage	$V_{GS(th)}$	1.0	1.2	1.7	V	V_{DS}=V_{GS},I_D=250μA
Drain-Source On-State Resistance	$R_{DS(on)}$	-	23	27	mΩ	V_{GS}=10V,I_D=20A
		-	28	34		V_{GS}=4.5V,I_D=10A
Gate Resistance	R_g	-	0.6	-	Ω	V_{GS}=0V, V_{DS} =0V, f=1MHz
Forward Transconductance	g_{fs}	-	12	-	S	V_{DS}=5V,I_D=8A

Dynamic characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Input Capacitance	C_{iss}	-	609	-	pF	V_{DS}=50V,V_{GS}=0V,f=1.0MHZ
Output Capacitance	C_{oss}	-	380	-		
Reverse Transfer Capacitance	C_{rss}	-	29	-		
Turn-On Delay Time	$t_{d(on)}$	-	8.5	-	ns	V_{DD}=50V,I_D=20A,V_{GS}=10V,R_{G_ext} =1.6Ω
Turn-On Rise Time	t_r	-	47	-		
Turn-Off Delay Time	$t_{d(off)}$	-	75	-		
Turn-Off Fall Time	t_f	-	0.7	-		

Gate charge characteristics

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Total Gate Charge	Q_g	-	14	-	nC	V_{DS}=50V,I_D=20A,V_{GS}=10V
Gate-Source Charge	Q_{gs}	-	3.5	-		
Gate-Drain Charge	Q_{gd}	-	2.7	-		

Reverse diode

Parameter	Symbol	Values			Unit	Note/Test Conditions
		Min	Typ	Max		
Continuous Diode Forward Current	I_S	-	-	40	A	TC = 25°C
Pulsed Diode Forward Current	I_{SM}	-	-	121	A	TC = 25°C
Diode Forward Voltage	V_{SD}	-	-	1.2	V	I_S=20A,V_{GS}=0V
Reverse Recovery Time	t_{rr}	-	47	-	ns	I_F=20A
Reverse Recovery Charge	Q_{rr}	-	32	-	nC	di/dt=100A/μs

Fig.1 Power Dissipation

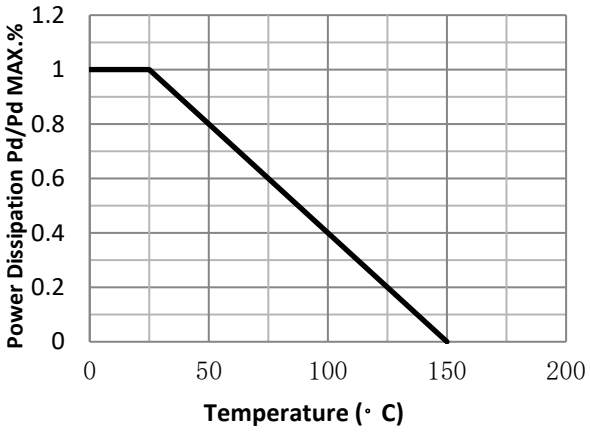


Fig.2 Typical output Characteristics

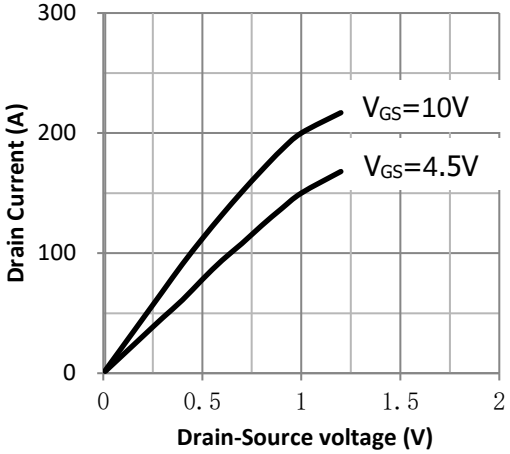


Fig.3 Threshold Voltage V.S Junction Temperature

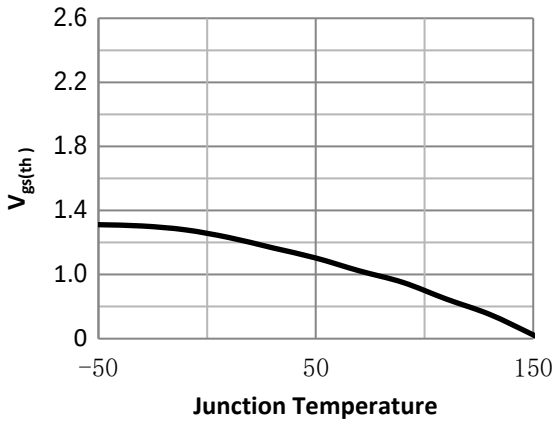


Fig.4 Resistance V.S Drain Current

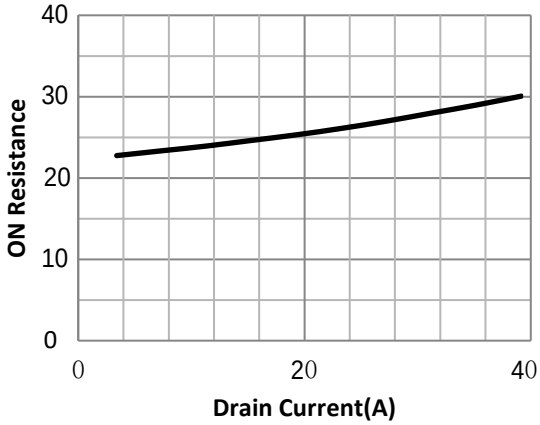


Fig.5 On-Resistance VS Drain Current

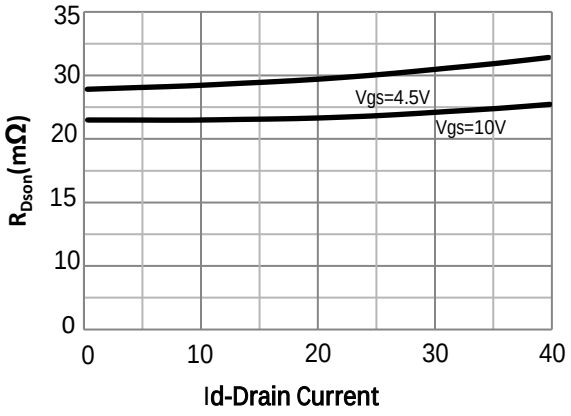


Fig.6 On-Resistance V.S Junction Temperature

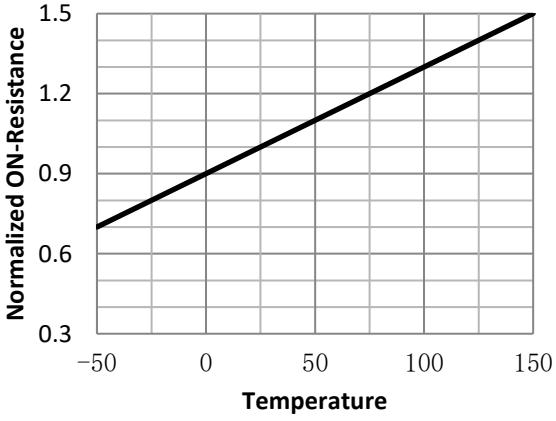


Fig.7 Switching Time Measurement Circuit

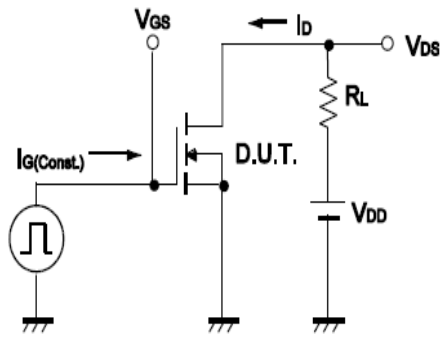


Fig.8 Gate Charge Waveform

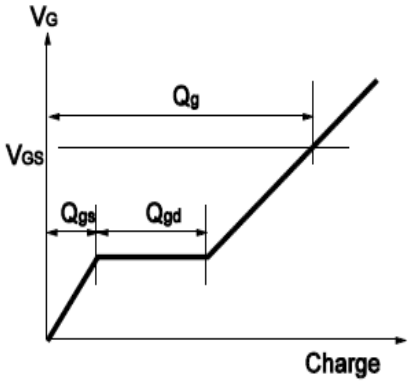


Fig.9 Switching Time Measurement Circuit

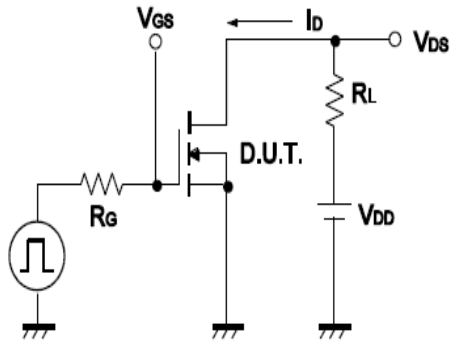


Fig.10 Gate Charge Waveform

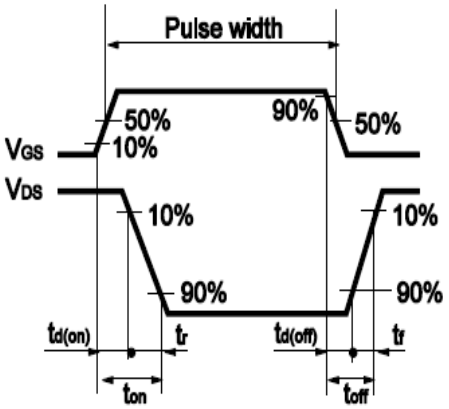


Fig.11 Avalanche Measurement Circuit

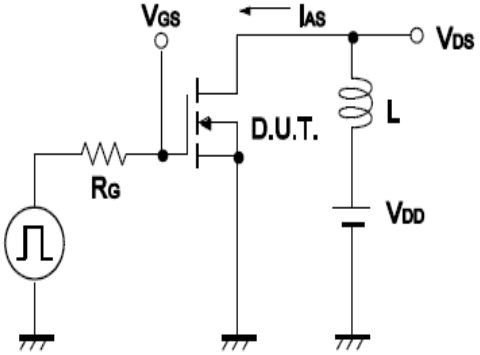
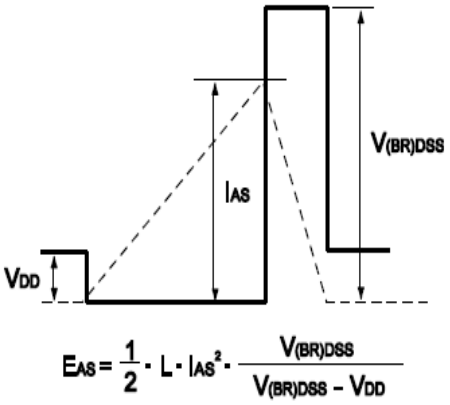
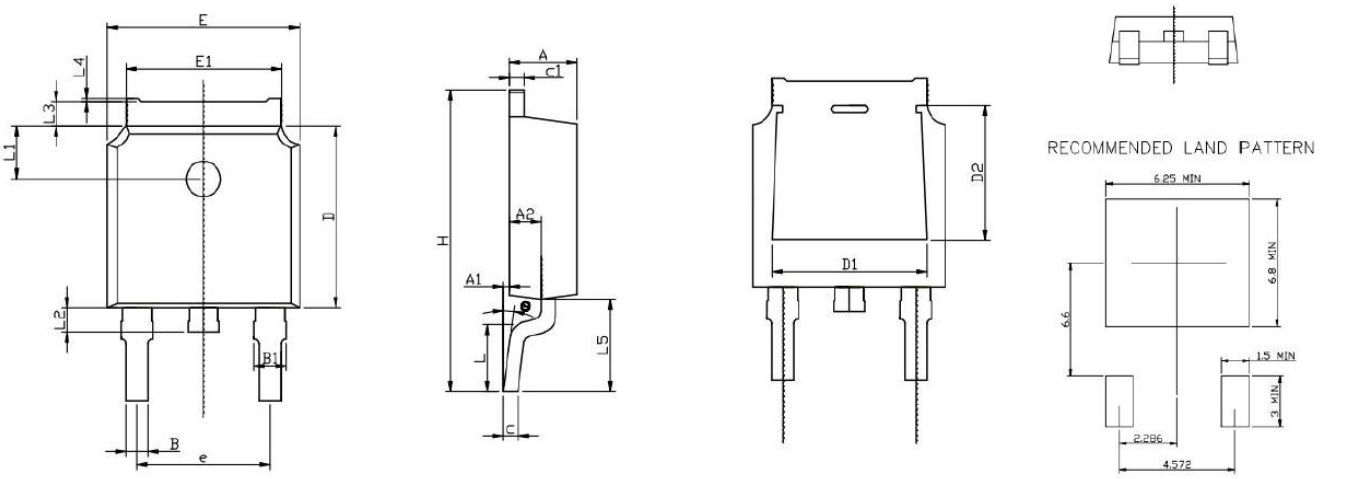


Fig.12 Avalanche Waveform



Package Outline: TO-252



UNIT: mm

SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.15	2.45	0.085	0.096
A1	0.05	0.20	0.002	0.008
A2	0.91	1.22	0.036	0.048
B	0.66	0.86	0.026	0.034
B1	0.93	1.23	0.037	0.048
C	0.40	0.60	0.016	0.024
C1	0.40	0.60	0.016	0.024
D	5.95	6.25	0.234	0.246
D1	4.80		0.189	
D2	3.80		0.150	
E	6.45	6.75	0.254	0.266
E1	5.12	5.52	0.202	0.217
L	1.65		0.065	
L1	1.58	1.98	0.062	0.078
L2	0.60	1.00	0.024	0.039
L3	0.70	1.00	0.028	0.039
L4	0.00	0.20	0.000	0.008
L5	2.80	3.40	0.110	0.134
H	9.80	10.40	0.386	0.409
θ	0.00	8.00	0.000	0.315
e	4.57		0.180	