

SWITCHING REGULATOR APPLICATIONS

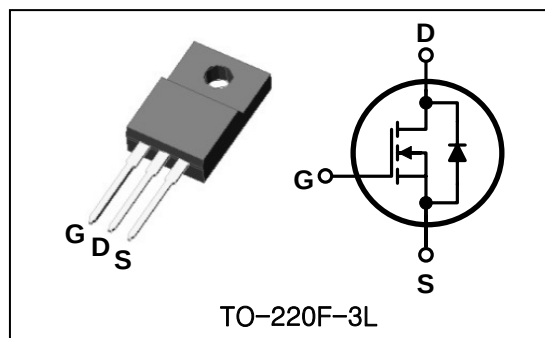
Features

- High Voltage : $BV_{DSS}=300V(\text{Min.})$
- Low C_{rss} : $C_{rss}=19pF(\text{Typ.})$
- Low gate charge : $Q_g=24nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)}=0.29\Omega(\text{Max.})$

Ordering Information

Type No.	Marking	Package Code
TSF14N30M	TSF14N30M	TO-220F-3L

PIN Connection



Absolute maximum ratings ($T_C=25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V _{DSS}		300	V
Gate-source voltage	V _{GSS}		±30	V
Drain current (DC) *	I _D	T _C =25℃	14	A
		T _C =100℃	8.8	A
Drain current (Pulsed) *	I _{DM}		56	A
Power dissipation	P _D		35	W
Avalanche current (Single) ②	I _{AS}		14	A
Single pulsed avalanche energy ②	E _{AS}		800	mJ
Avalanche current (Repetitive) ①	I _{AR}		14	A
Repetitive avalanche energy ①	E _{AR}		25	mJ
Junction temperature	T _J		150	℃
Storage temperature range	T _{stg}		-55~150	

* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	R _{th(J-C)}	-	0.89	°C/W
	Junction-ambient	R _{th(J-A)}	-	62.5	

Electrical Characteristics (T_C=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	300	-	-	V
Gate threshold voltage	V _{GS(th)}	I _D =250μA, V _{DS} =V _{GS}	3.0	-	5.0	V
Drain-source cut-off current	I _{DSS}	V _{DS} =300V, V _{GS} =0V	-	-	1	μA
		V _{DS} =300V, V _{GS} =0V, TC=125°C	-	-	200	
Gate leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±30V	-	-	±100	nA
Drain-source on-resistance ④	R _{DS(on)}	V _{GS} =10V, I _D =7.0A	-	0.24	0.29	Ω
Forward transfer conductance ④	g _{fs}	V _{DS} =10V, I _D =7.0A	-	7.8	-	S
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V f=1 MHz	-	1075	1344	pF
Output capacitance	C _{oss}		-	182	228	
Reverse transfer capacitance	C _{rss}		-	19	23.8	
Turn-on delay time	t _{d(on)}	V _{DD} =150V, I _D =14A R _G =25Ω ③④	-	22	-	ns
Rise time	t _r		-	145	-	
Turn-off delay time	t _{d(off)}		-	45	-	
Fall time	t _f		-	70	-	
Total gate charge	Q _g	V _{DS} =240V, V _{GS} =10V I _D =14A ③④	-	24	30	nC
Gate-source charge	Q _{gs}		-	8.5	-	
Gate-drain charge	Q _{gd}		-	9.5	-	

Source-Drain Diode Ratings and Characteristics (T_C=25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I _S	Integral reverse diode in the MOSFET	-	-	14	A
Source current (Pulsed) ①	I _{SM}		-	-	56	
Forward voltage ④	V _{SD}	V _{GS} =0V, I _S =14A	-	-	1.4	V
Reverse recovery time	t _{rr}	I _S =14A, V _{GS} =0V dI _F /dt=100A/μs	-	235	-	ns
Reverse recovery charge	Q _{rr}		-	1.6	-	μC

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=6.8mH, I_{AS}=14A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
- ③ Pulse Test : Pulse width≤300μs, Duty cycle≤2%
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

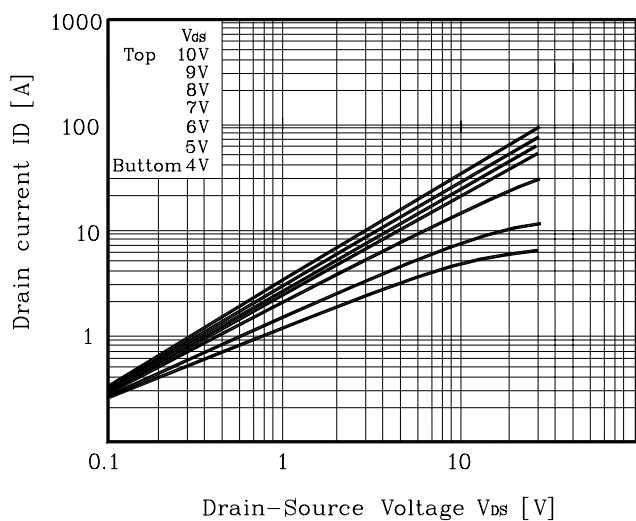


Fig. 2 $I_D - V_{GS}$

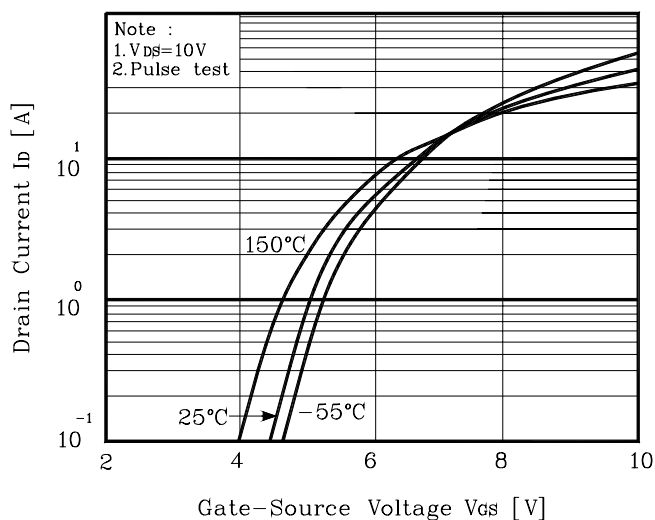


Fig. 3 $R_{DS(on)} - I_D$

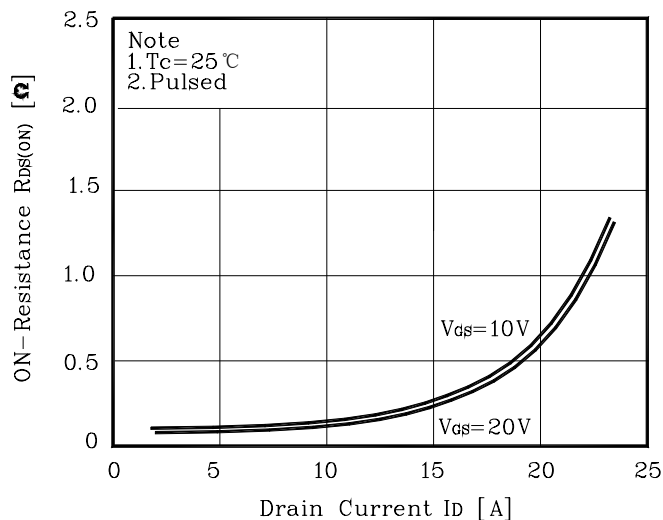


Fig. 4 $I_S - V_{SD}$

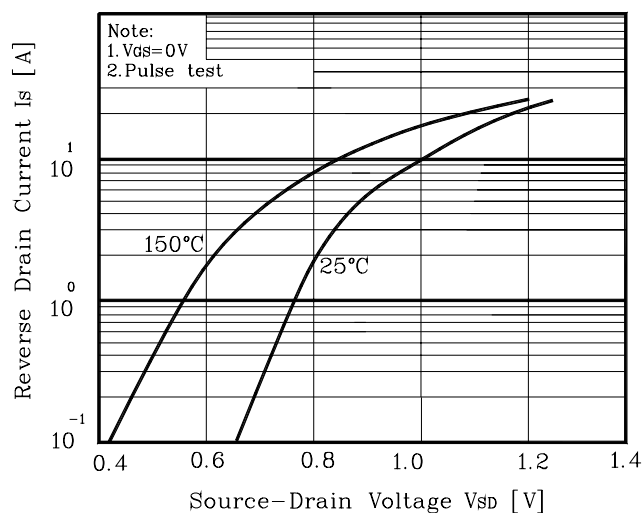


Fig. 5 Capacitance - V_{DS}

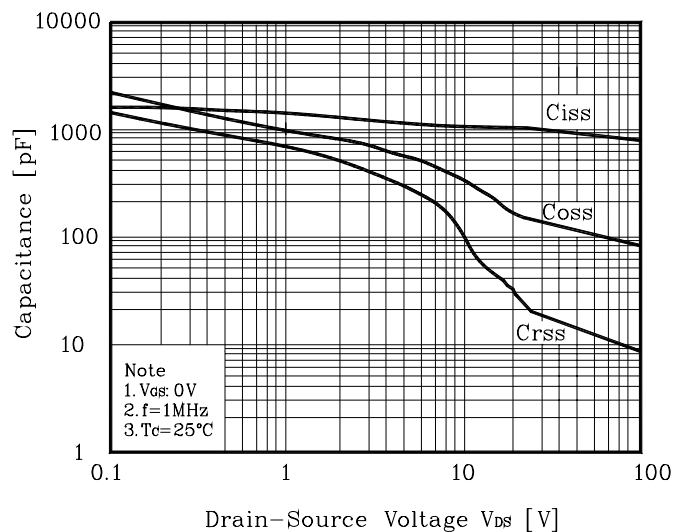


Fig. 6 $V_{GS} - Q_G$

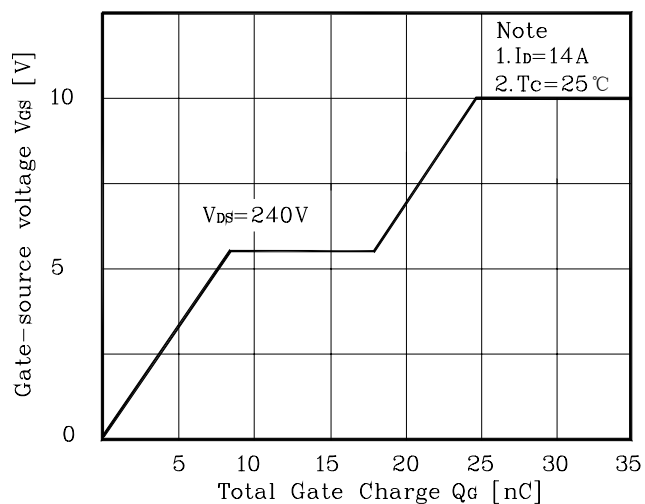


Fig. 7 $V_{DSS} - T_J$

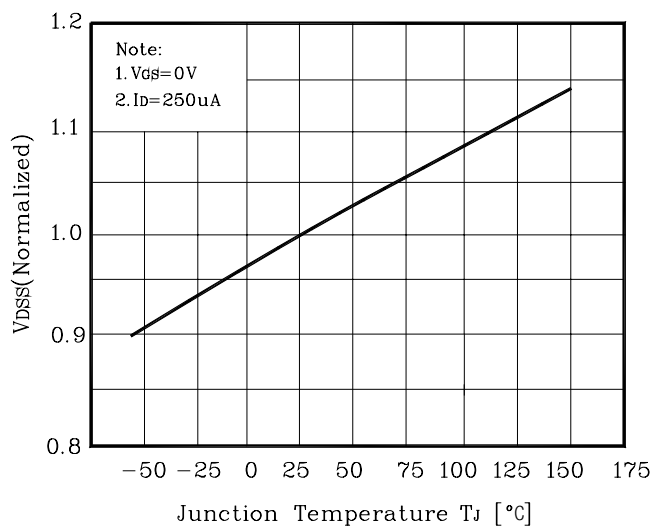


Fig. 8 $R_{DS(on)} - T_J$

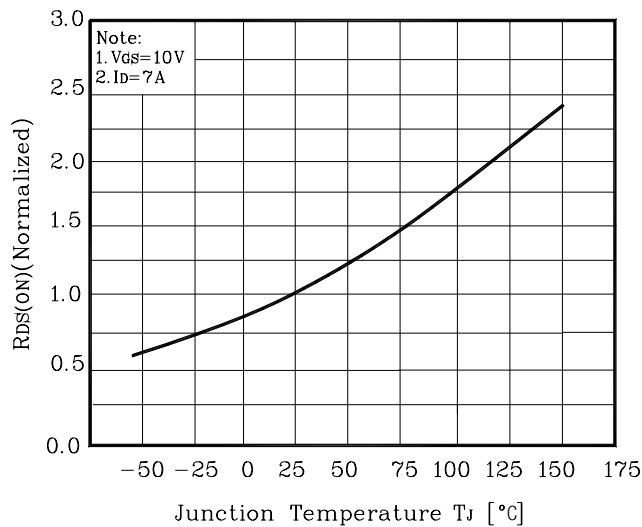


Fig. 9 $I_D - T_C$

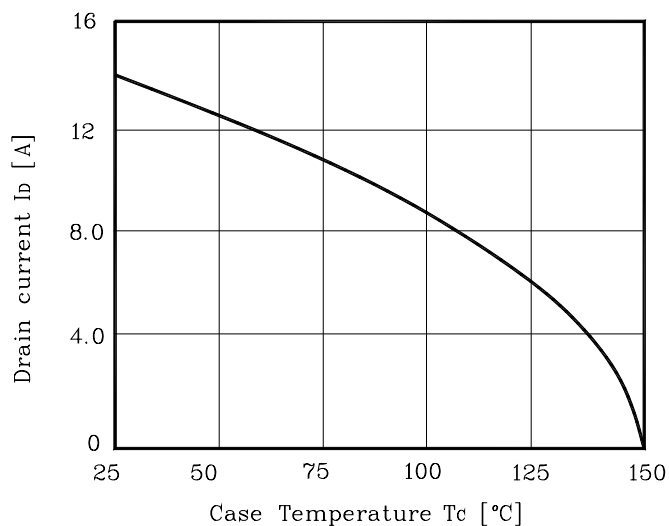


Fig. 10 Safe Operating Area

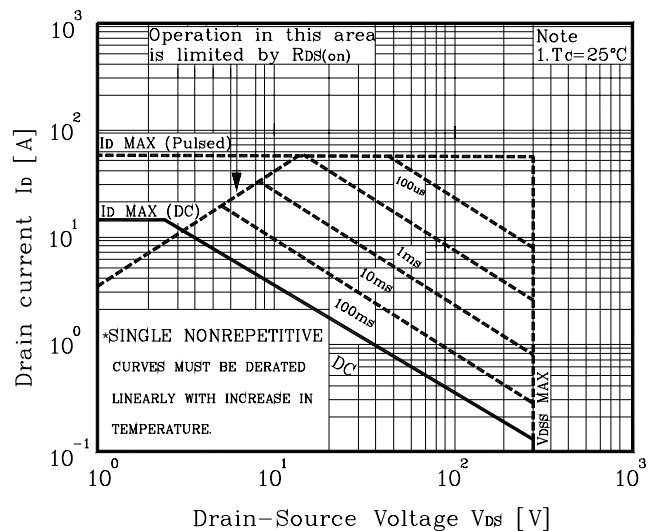


Fig. 11 Gate Charge Test Circuit & Waveform

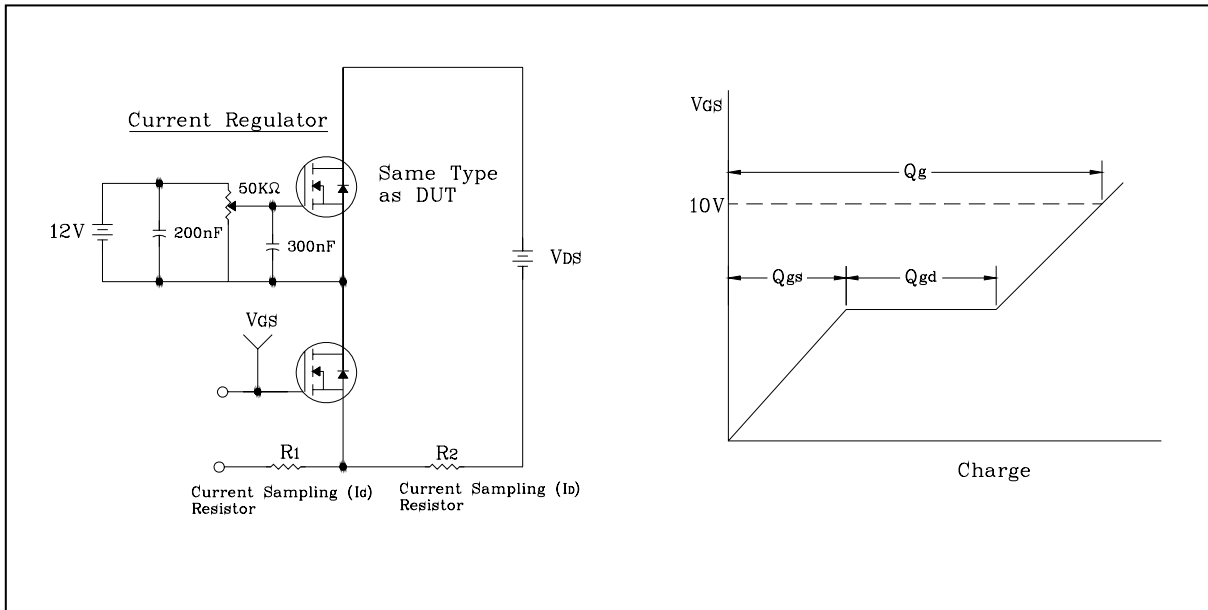


Fig. 12 Resistive Switching Test Circuit & Waveform

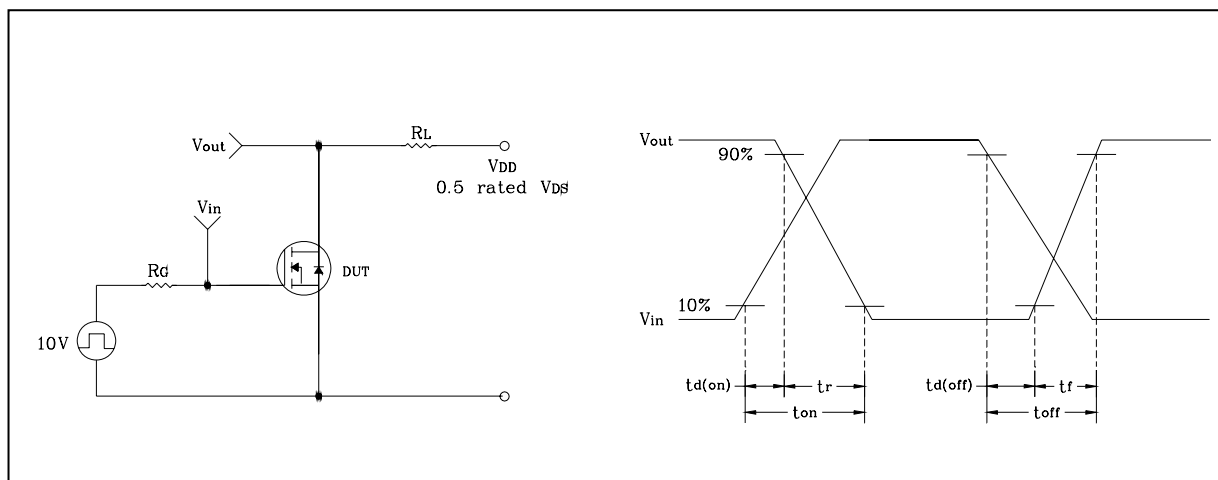


Fig. 13 E_{AS} Test Circuit & Waveform

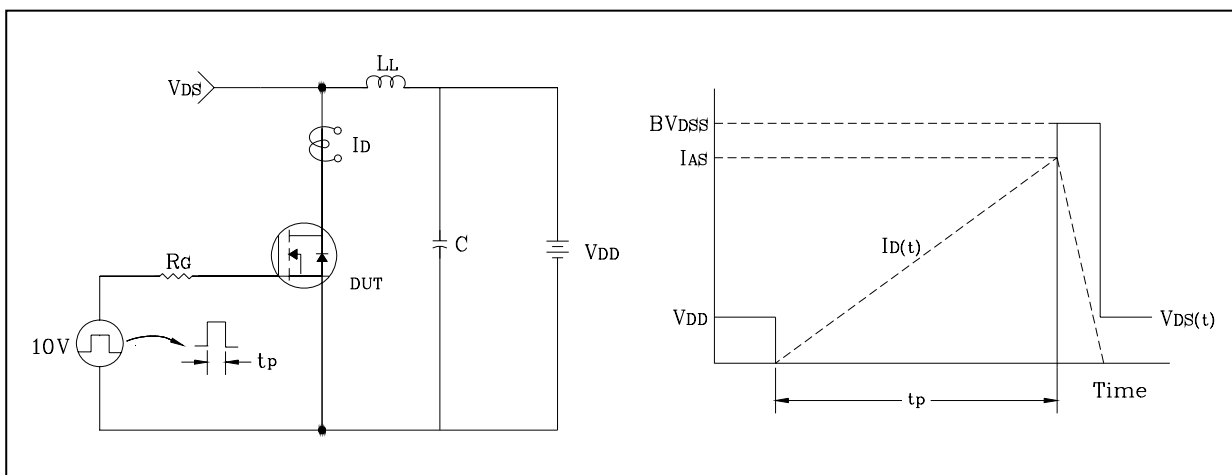


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform

