

## SWITCHING REGULATOR APPLICATIONS

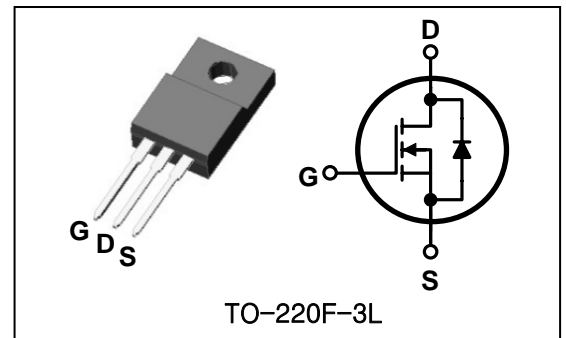
### Features

- High Voltage:  $BV_{DSS}=500V(\text{Min.})$
- Low  $C_{RSS}$  :  $C_{RSS}=8.4pF(\text{Typ.})$
- Low gate charge :  $Q_g=17nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=1.5\Omega(\text{Max.})$

### Ordering Information

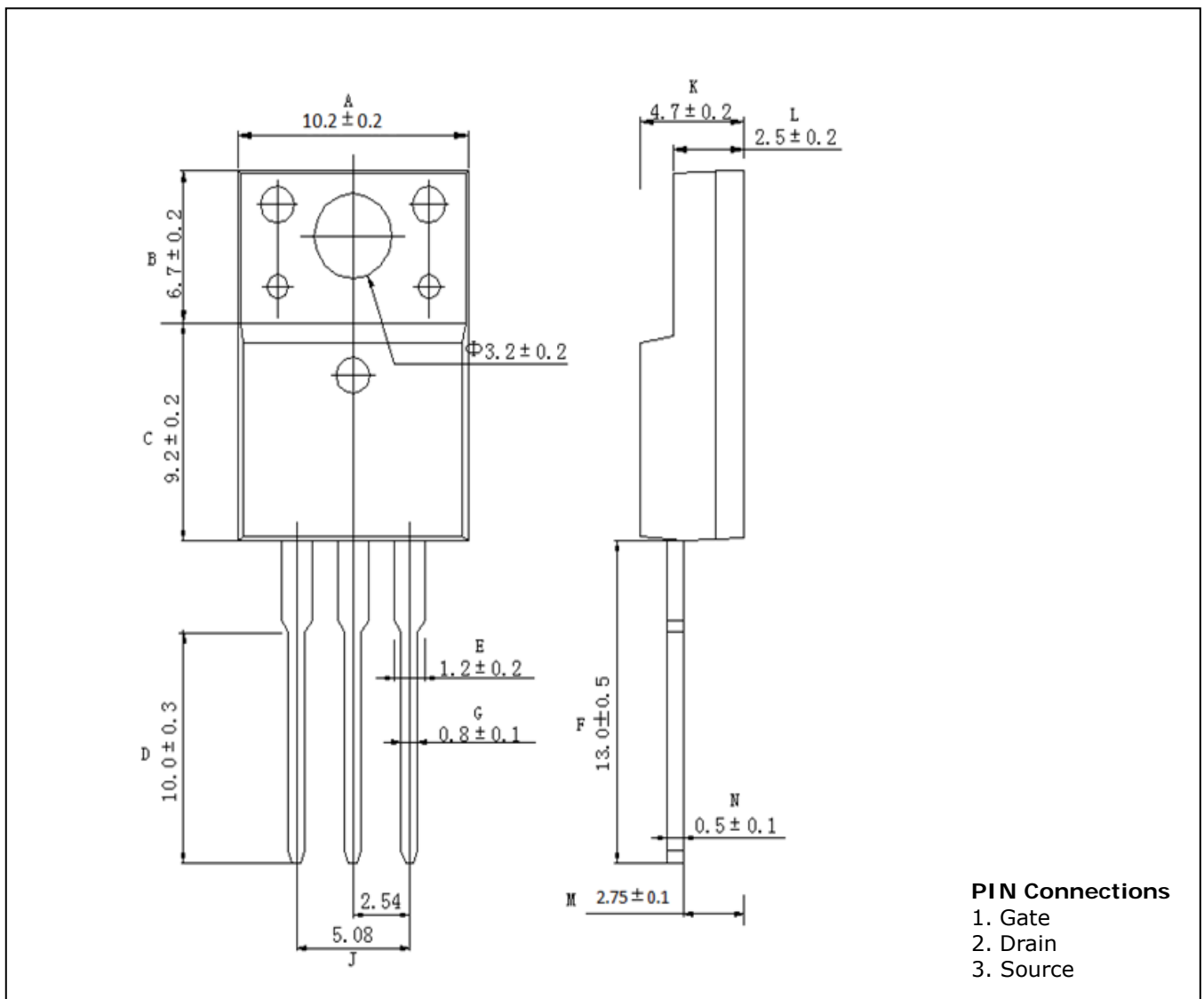
Type NO.	Marking	Package Code
MF830	MF830	TO-220F-3L

### PIN Connection



### Outline Dimensions

unit : mm



## Absolute maximum ratings

(T<sub>c</sub>=25°C)

Characteristic	Symbol	Rating	Unit	
Drain-source voltage	V <sub>DSS</sub>	500	V	
Gate-source voltage	V <sub>GSS</sub>	±30	V	
Drain current (DC)	I <sub>D</sub>	T <sub>C</sub> =25°C	4.5	A
		T <sub>C</sub> =100°C	3.3	A
Drain current (Pulsed) *	I <sub>DM</sub>	18	A	
Drain power dissipation	P <sub>D</sub>	28	W	
Avalanche current (Single) ②	I <sub>AS</sub>	4.5	A	
Single pulsed avalanche energy ②	E <sub>AS</sub>	250	mJ	
Avalanche current (Repetitive) ①	I <sub>AR</sub>	4.5	A	
Repetitive avalanche energy ①	E <sub>AR</sub>	5.0	mJ	
Junction temperature	T <sub>J</sub>	150	°C	
Storage temperature range	T <sub>stg</sub>	-55~150	°C	

\* Limited by maximum junction temperature

Characteristic		Symbol	Typ.	Max	Unit
Thermal resistance	Junction-case	R <sub>th(J-C)</sub>	-	4.46	°C/W
	Junction-ambient	R <sub>th(J-A)</sub>	-	62.5	

## Electrical Characteristics

(Tc=25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D=250\ \mu A, V_{GS}=0V$	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\ \mu A, V_{DS}=V_{GS}$	2.0	-	4.0	V
Drain-source cut-off current	$I_{DSS}$	$V_{DS}=500V, V_{GS}=0V$	-	-	10	$\mu A$
Gate leakage current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$	-	-	$\pm 100$	nA
Drain-source on-resistance ④	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.25A$	-	-	1.5	$\Omega$
Forward transfer conductance ④	$g_{fs}$	$V_{DS}=10V, I_D=2.25A$	-	3.3	-	S
Input capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V$ $f=1\ MHz$	-	550	830	pF
Output capacitance	$C_{oss}$		-	46	70	
Reverse transfer capacitance	$C_{rss}$		-	8.4	15	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=250V, I_D=4.5A$ $R_G=12\ \Omega$	-	12	-	ns
Rise time	$t_r$		-	46	-	
Turn-off delay time	$t_{d(off)}$		-	50	-	
Fall time	$t_f$		-	48	-	
Total gate charge	$Q_g$	$V_{DS}=250V, V_{GS}=10V$ $I_D=4.5A$	-	17	26	nC
Gate-source charge	$Q_{gs}$		-	2.6	4.0	
Gate-drain charge	$Q_{gd}$		-	5.8	9.0	

## Source-Drain Diode Ratings and Characteristics

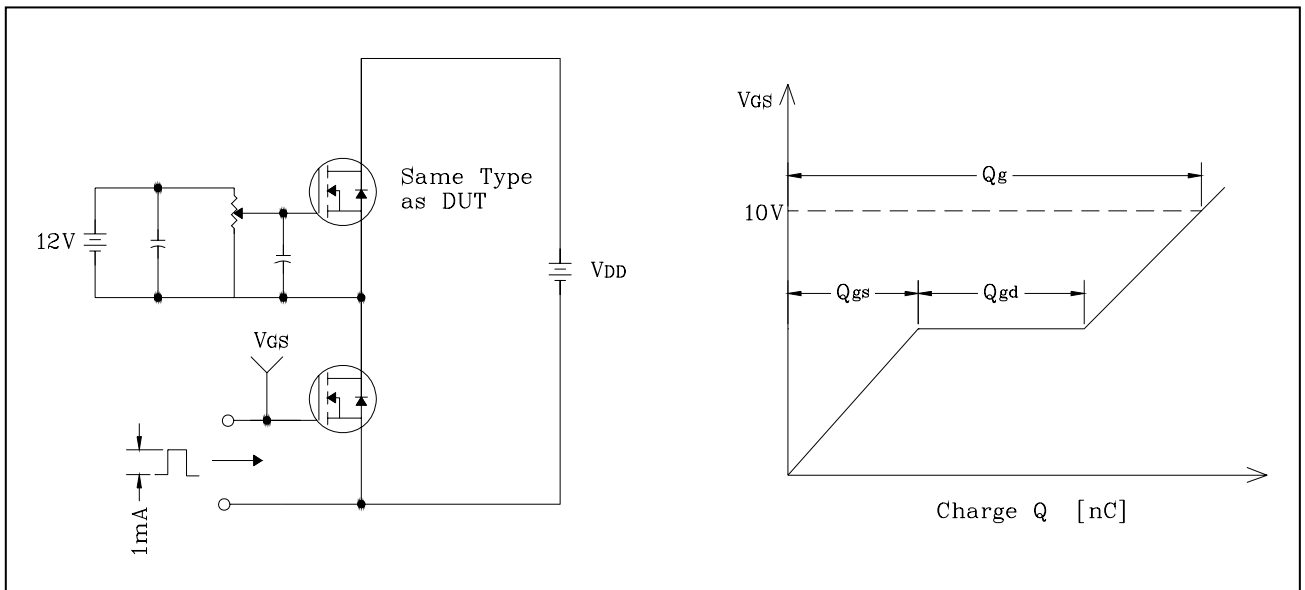
(Tc=25°C)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Source current (DC)	$I_S$	Integral reverse diode in the MOSFET	-	-	4.5	A
Source current (Pulsed) ①	$I_{SP}$		-	-	18	
Forward voltage ④	$V_{SD}$	$V_{GS}=0V, I_S=4.5A$	-	-	1.4	V
Reverse recovery time	$t_{rr}$	$I_S=4.5A, V_{GS}=0V$ $dI_S/dt=100A/\mu s$	-	188	-	ns
Reverse recovery charge	$Q_{rr}$		-	2.1	-	$\mu C$

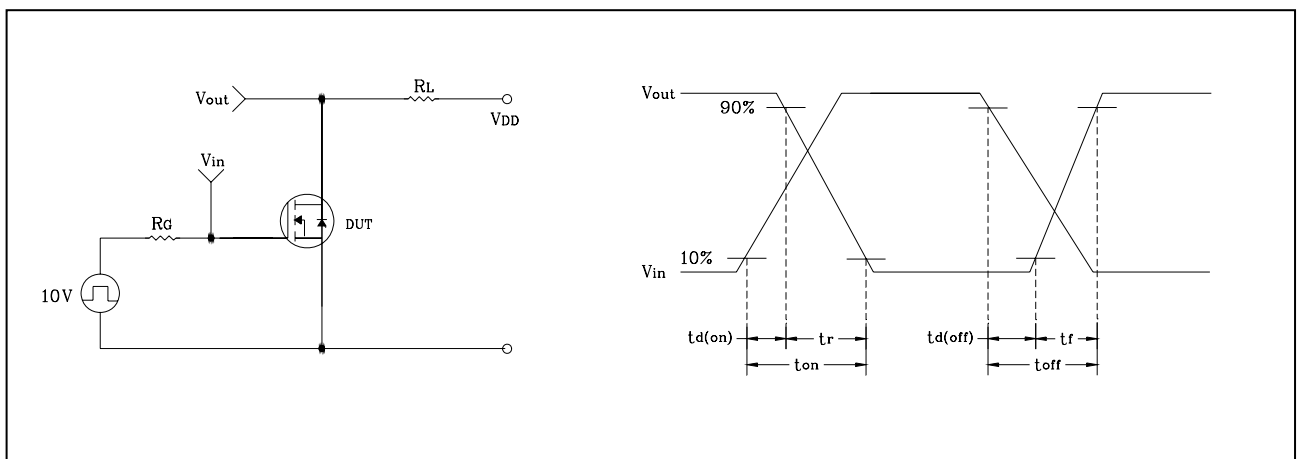
Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ②  $L=20mH, I_{AS}=4.5A, V_{DD}=50V, R_G=27\ \Omega$
- ③ Pulse Test : Pulse width  $\leq 400\ \mu s$ , Duty cycle  $\leq 2\%$
- ④ Essentially independent of operating temperature

**Fig. 11 Gate Charge Test Circuit & Waveform**



**Fig. 12 Switching Time Test Circuit & Waveform**



**Fig. 13 E<sub>AS</sub> Test Circuit & Waveform**

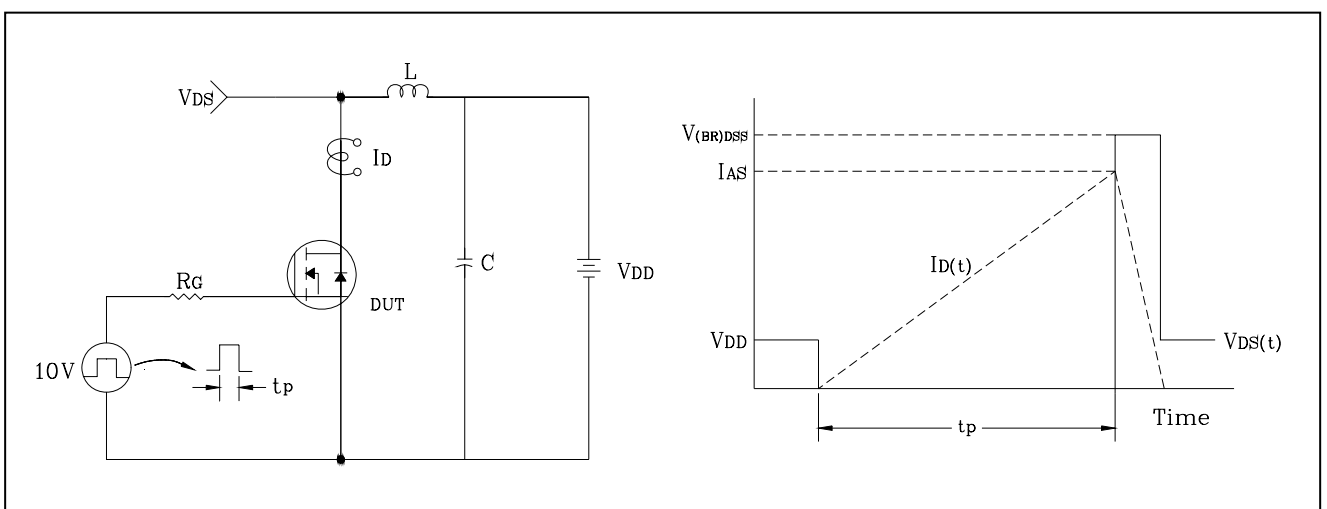


Fig. 14 Peak Diode Recovery dv/dt Test Circuit & Waveform

