

SWITCHING REGULATOR APPLICATIONS

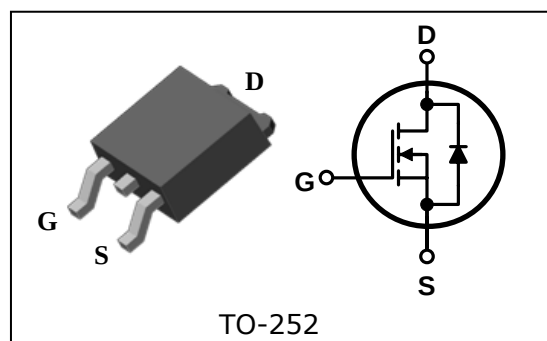
Features

- High Voltage : $BV_{DSS}=600V$ (Min.)
- Low C_{rss} : $C_{rss}=14pF$ (Typ.)
- Low gate charge : $Q_g=16nC$ (Typ.)
- Low $R_{DS(on)}$: $R_{DS(on)}=2.5\Omega$ (Max.)

Ordering Information

Type No.	Marking	Package Code
MU4N60	MU4N60	TO-252

PIN Connection



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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	600	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current (DC) *	I_D	($T_C=25^\circ C$)	4.0
		($T_C=100^\circ C$)	2.5
Drain current (Pulsed) *	I_{DM}	16.0	A
Power dissipation	P_D	80	W
Avalanche current (Single) ②	I_{AS}	4.0	A
Single pulsed avalanche energy ②	E_{AS}	240	mJ
Avalanche current (Repetitive) ①	I_{AR}	4.0	A
Repetitive avalanche energy ①	E_{AR}	10	mJ
Junction temperature	T_J	150	$^\circ C$
Storage temperature range	T_{stg}	-55~150	

* Limited by maximum junction temperature

Characteristic	Symbol	Typ.	Max.	Unit
Thermal resistance	Junction-case	$R_{th(J-C)}$	-	1.56
	Junction-ambient	$R_{th(J-A)}$	-	110

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 =250uA, V _{GS} =0	600	-	-	V
Gate threshold voltage	V _{GS(th)}	I _D =250uA, V _{DS} =V _{GS}	2.0	-	4.0	V
Drain-source cut-off current	I _{DSS}	V _{DS} =600V, V _{GS} =0	-	-	10	uA
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 =3.25A		2.1	2.5	Ω
Forward transfer conductance ④	g _{fs}	V _{DS} =10V, I _D =0.5A	-	0.8	-	S
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1MHz	-	710	920	pF
Output capacitance	C _{oss}		-	65	85	
Reverse transfer capacitance	C _{rss}		-	14	19	
Turn-on delay time	t _{d(on)}	V _{DD} =300V, I _D =4.4A R _G =25Ω ③④	-	20	50	ns
Rise time	t _r		-	55	120	
Turn-off delay time	t _{d(off)}		-	70	150	
Fall time	t _f		-	50	120	
Total gate charge	Q _g	V _{DS} =480V, V _{GS} =10V I _D =4.4A ③④	-	16	20	nC
Gate-source charge	Q _{gs}		-	3.4	-	
Gate-drain charge	Q _{gd}		-	7.0	-	

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			4	A
Source current (Pulsed) ①	I _{SM}				17.6	
Forward voltage ④	V _{SD}	V _{GS} =0V, I _S A=4.4A			1.4	V
Reverse recovery time	t _{rr}	I _S =4.4A, V _{GS} =0V dI _F /dt=100A/us	-	390	-	ns
Reverse recovery charge	Q _{rr}		-	2.2	-	uC

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=1080mH, I_{AS}=0.3A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
- ③ Pulse Test : Pulse width≤300us, Duty cycle≤2%
- ④ Essentially independent of operating temperature

Electrical Characteristic Curves

Fig. 1 $I_D - V_{DS}$

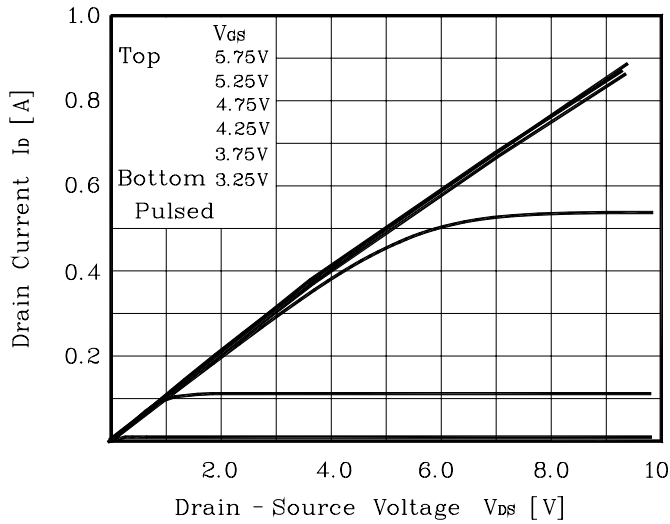


Fig. 2 $I_D - V_{GS}$

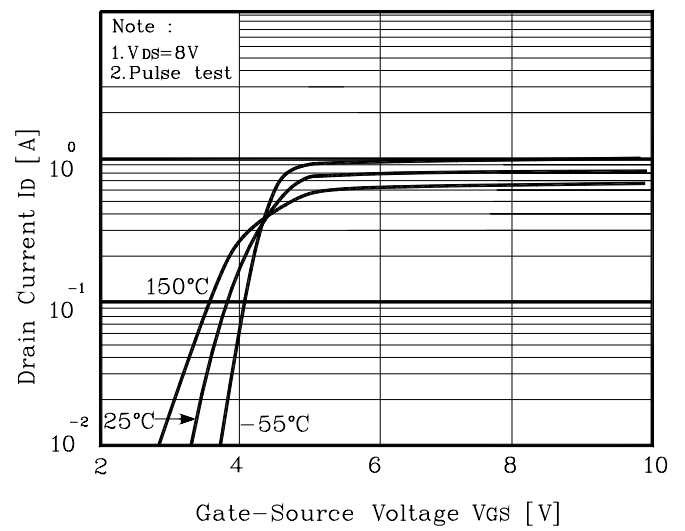


Fig. 3 $R_{DS(on)} - I_D$

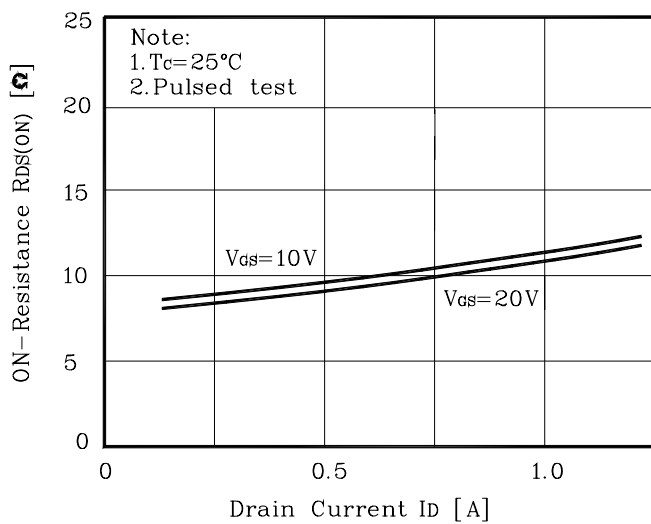


Fig. 4 $I_S - V_{SD}$

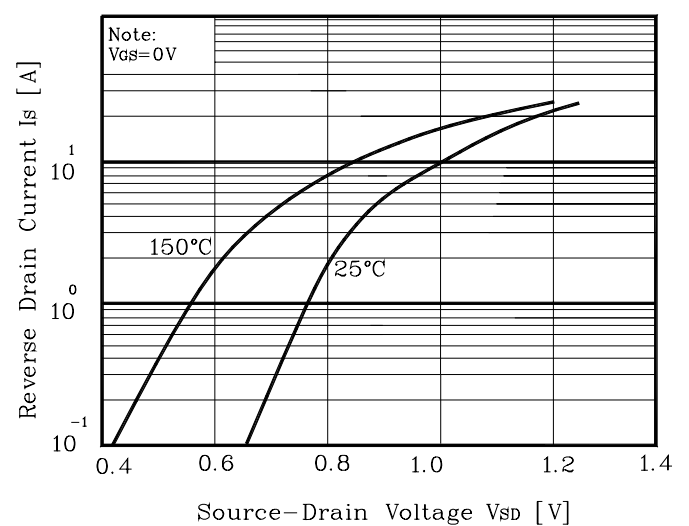


Fig. 5 Capacitance - V_{DS}

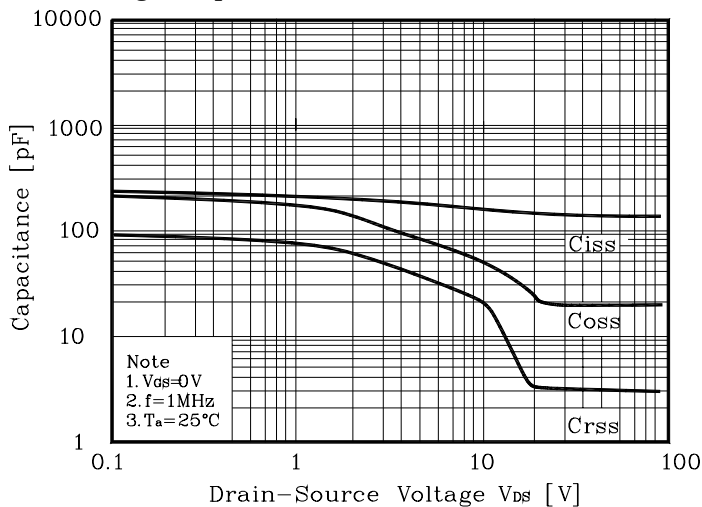


Fig. 6 $V_{GS} - Q_G$

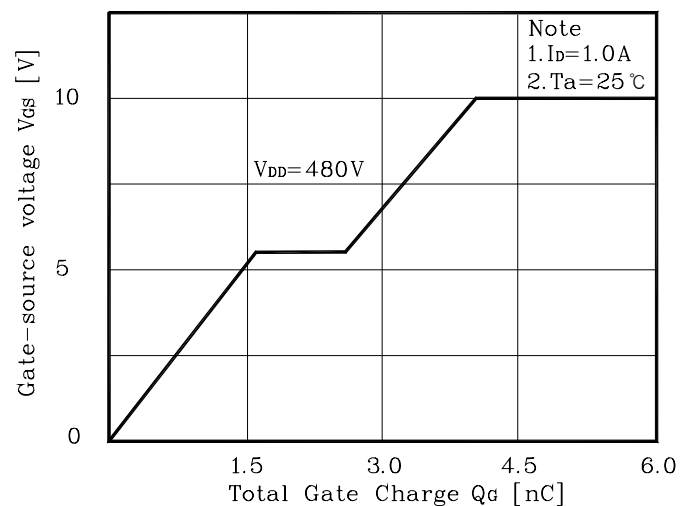


Fig. 7 $V_{DS} - T_J$

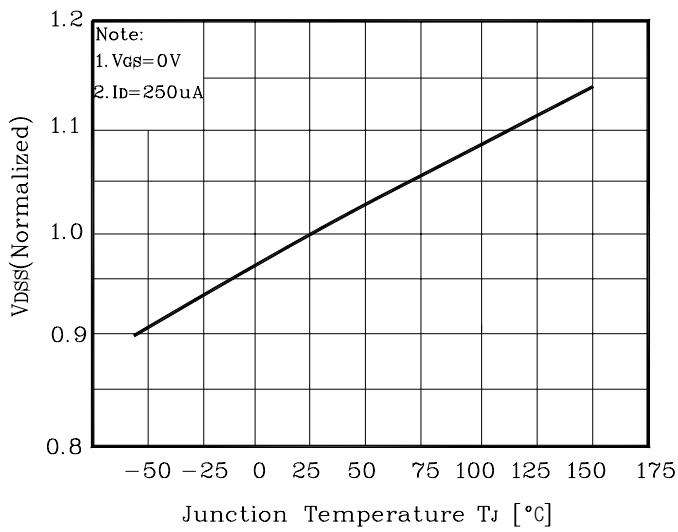


Fig. 8 $R_{DS(on)} - T_J$

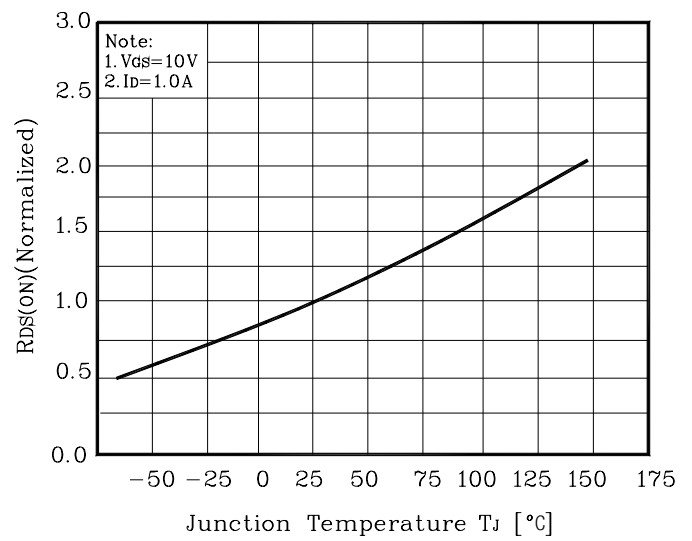


Fig. 9 $I_D - T_a$

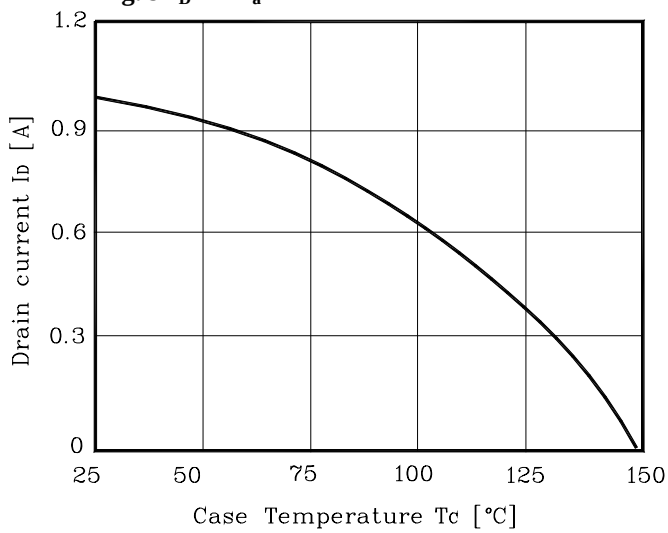


Fig. 10 Safe Operating Area

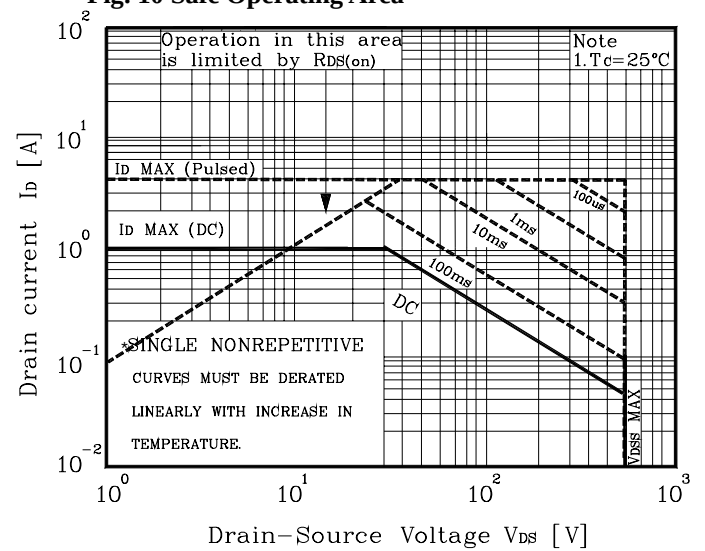


Fig. 11 Gate Charge Test Circuit & Waveform

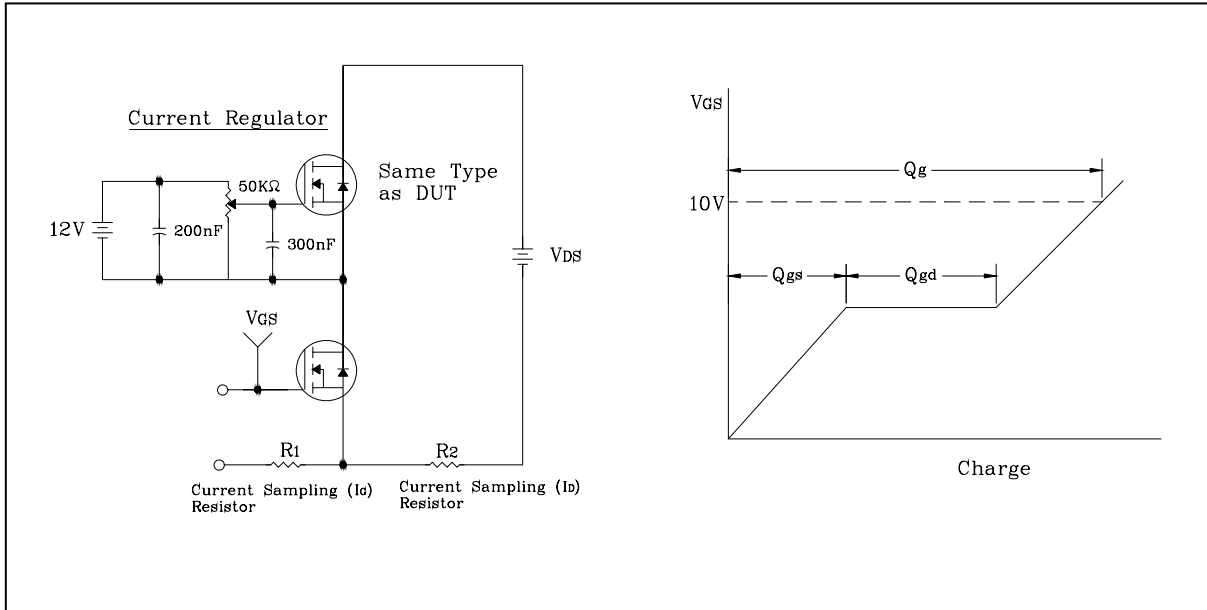


Fig. 12 Resistive Switching Test Circuit & Waveform

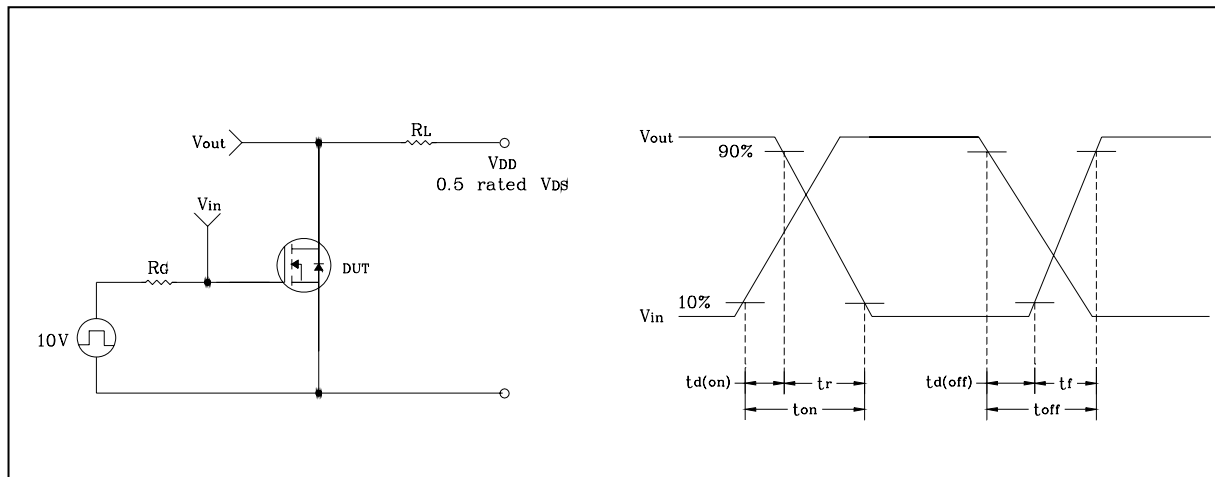


Fig. 13 E_{AS} Test Circuit & Waveform

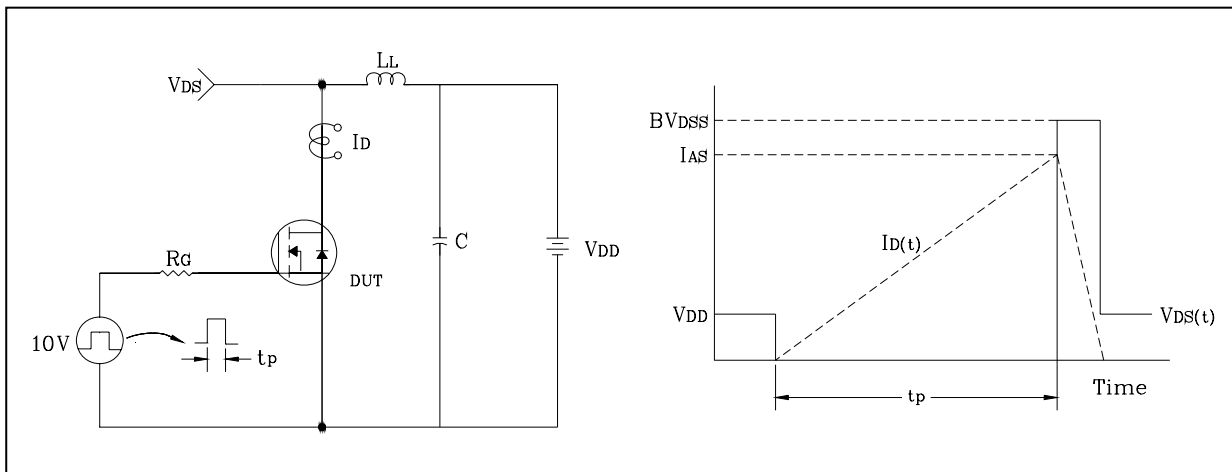
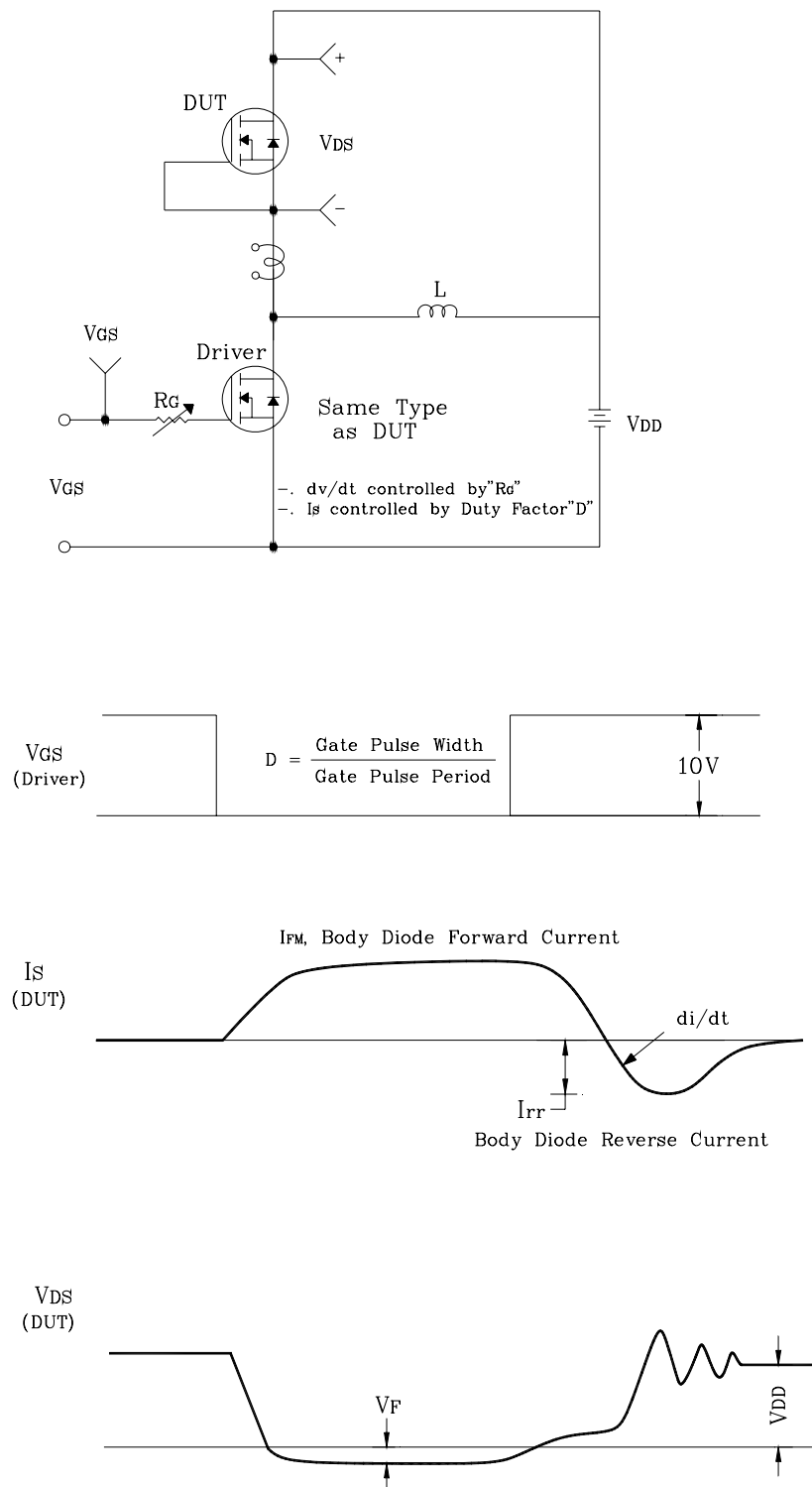


Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform



Outline Dimension

unit: mm

