

600V 4A Advanced N-Ch Power MOSFET

FEATURES

- High Voltage : $BV_{DS} = 600V(\text{Min.})$
- Low C_{rss} : $C_{rss} = 6.3pF(\text{Typ.})$
- Low gate charge : $Q_g = 12nC(\text{Typ.})$
- Low $R_{DS(on)}$: $R_{DS(on)} = 2.1\Omega(\text{Typ.})$
- Lower EMI noise
- 100% Avalanche tested

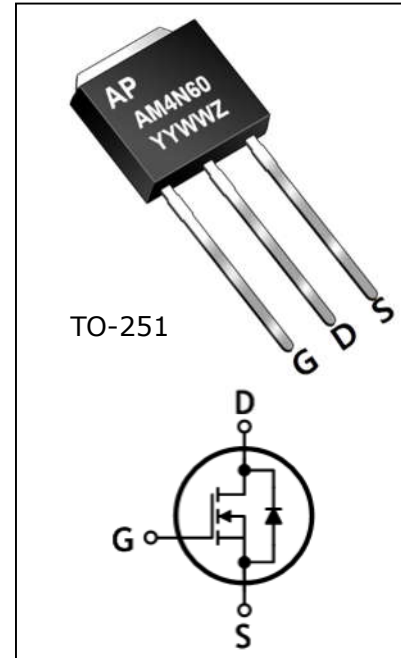
Marking Information

Row 1 : AP

Row 2 : Product Information

Row 3 : Date Code

- YY : Year Code
- WW : Week Code



Ordering Information

Part No	Package	Packing	Finish	Halogen	Packing Unit
AM4N60U	TO-251	Tube	Sn	Free	3,600ea

Maximum Ratings (Tc=25 °C, unless otherwise noted)

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DS}	600	V
Gate-source voltage	V_{GS}	± 30	V
Drain current (DC)*	I_D	$T_C = 25^\circ C$	4
		$T_C = 100^\circ C$	2.53
Drain current (Pulsed)*	I_{DM}	16	A
Power Dissipation – TO220F	P_D	52	W
Avalanche current (Single) (Note 2)	I_{AS}	4	A
Single pulsed avalanche energy (Note 2)	E_{AS}	175	mJ
Avalanche current (Repetitive) (Note 1)	I_{AR}	4	A
Repetitive avalanche energy (Note 1)	E_{AR}	3.26	mJ
Junction temperature	T_J	150	$^\circ C$
Storage temperature range	T_{stg}	-55~150	

*Limited only maximum junction temperature

Thermal Characteristic

Characteristic	Symbol	Rating	Unit
Thermal resistance, junction to case	$R_{th(j-c)}$	Max. 3.9	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 62.5	

Electrical Characteristics ($T_C=25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DS}	$I_D = 250\mu\text{A}$, $V_{GS} = 0$	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D = 250\mu\text{A}$, $V_{DS} = V_{GS}$	3	-	5	V
Drain-source cut-off current	I_{DSS}	$V_{DS} = 600\text{V}$, $V_{GS} = 0\text{V}$	-	-	1	μA
Gate leakage current	I_{GSS}	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 30\text{V}$	-	-	± 100	nA
Drain-source on-resistance (Note 4)	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$, $I_D = 2\text{A}$	-	2.1	2.5	Ω
Forward transfer conductance (Note 4)	g_{fs}	$V_{DS} = 10\text{V}$, $I_D = 2\text{A}$	-	5	-	S
Input capacitance	C_{iss}	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$	-	720	-	pF
Output capacitance	C_{oss}		-	53	-	
Reverse transfer capacitance	C_{rss}		-	6.3	-	
Turn-on delay time (Note 3,4)	$T_{d(on)}$	$V_{DS} = 300\text{V}$, $I_D = 4\text{A}$, $R_G = 25\Omega$	-	34	-	ns
Rise time (Note 3,4)	T_r		-	41	-	
Turn-off delay time (Note 3,4)	$t_{d(off)}$		-	79	-	
Fall time (Note 3,4)	t_f		-	26	-	
Total gate charge (Note 3,4)	Q_g	$V_{DS} = 520\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 4\text{A}$	-	12	15	nC
Gate-source charge (Note 3,4)	Q_{gs}		-	5	-	
Gate-drain charge (Note 3,4)	Q_g		-	2.5	-	

Source-Drain Diode Ratings and Characteristics ($T_C=25\text{ }^{\circ}\text{C}$, 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) (Note 1)	I_{SM}		-	-	16	A
Forward voltage (Note 4)	V_{SD}	$V_{GS} = 0\text{V}$, $I_S = 9\text{A}$	-	-	1.4	V
Reverse recovery time (Note 3, 4)	t_{rr}	$I_S = 9\text{A}$, $V_{GS} = 0\text{V}$ $dI_F/dt = 100\text{A}/\mu\text{s}$	-	375	-	ns
Reverse recovery charge (Note 3, 4)	Q_{rr}		-	1.15	-	μC

Note :

1. Repetitive rating : Pulse width limited by maximum junction temperature.
2. $L=20\text{mH}$, $I_{AS}=4\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$
3. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Electrical Characteristic Curves

Fig. 1 Typical Output Characteristics

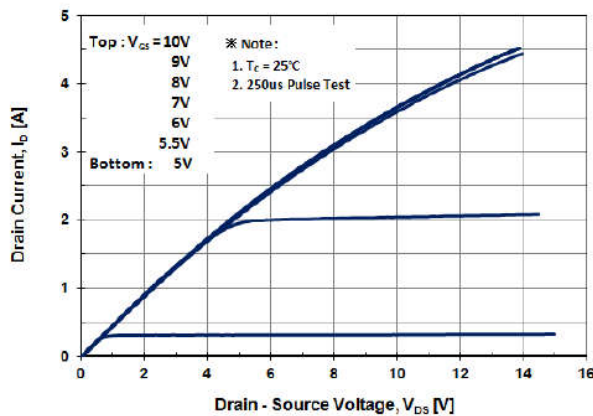


Fig. 2 Typical Output Characteristics

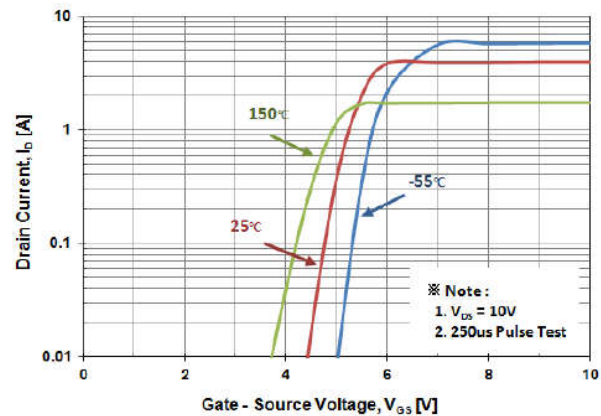


Fig. 3 On-Resistance Variation with Drain Current and Gate Voltage

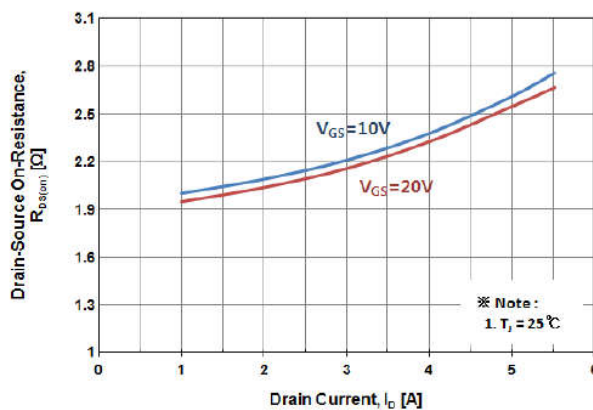


Fig. 4 Body Diode Forward Voltage Variation with Source Current

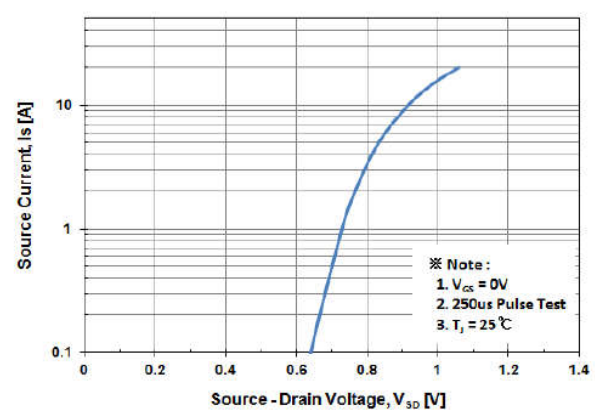


Fig. 5 Typical Capacitance Characteristics

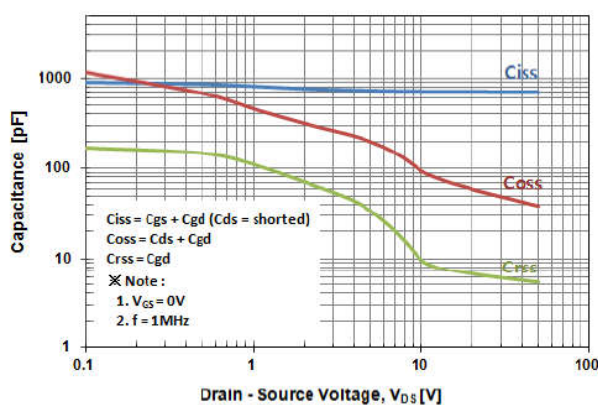


Fig. 6 Typical Total Gate Charge Characteristics

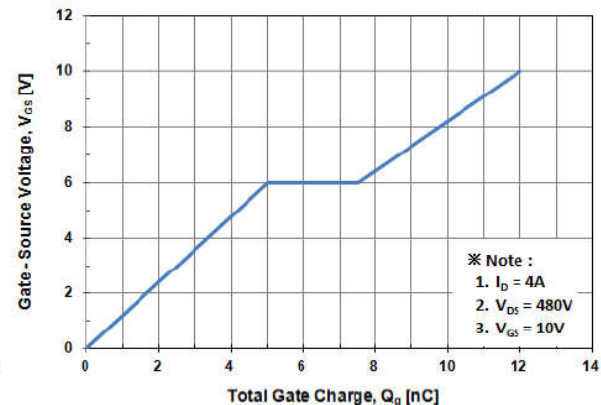


Fig. 7 Breakdown Voltage Variation vs. Temperature

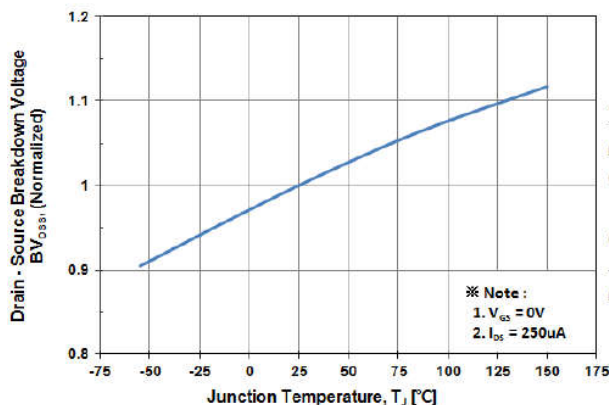


Fig. 8 On-Resistance Variation vs. Temperature

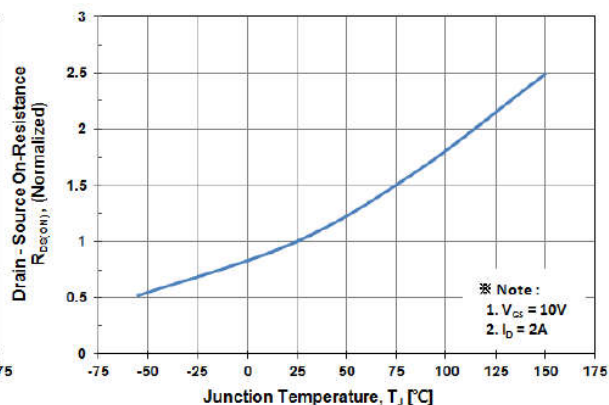


Fig. 9 Maximum Drain Current vs. Case Temperature

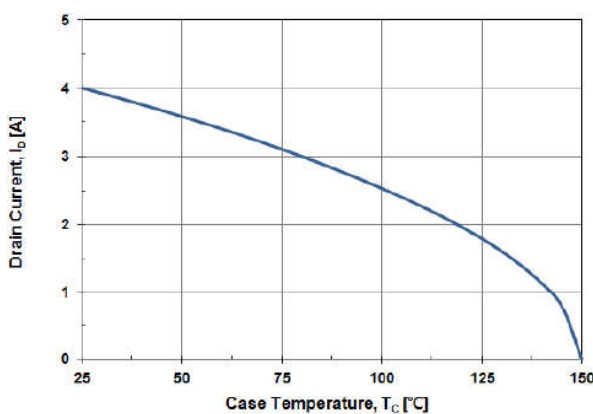


Fig. 10 Maximum Safe Operating Area

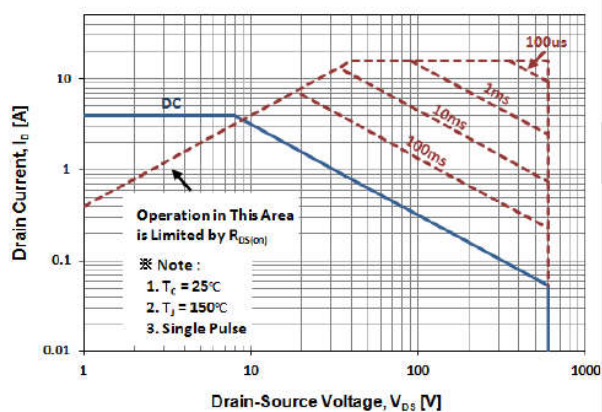


Fig. 11 Transient Thermal Impedance

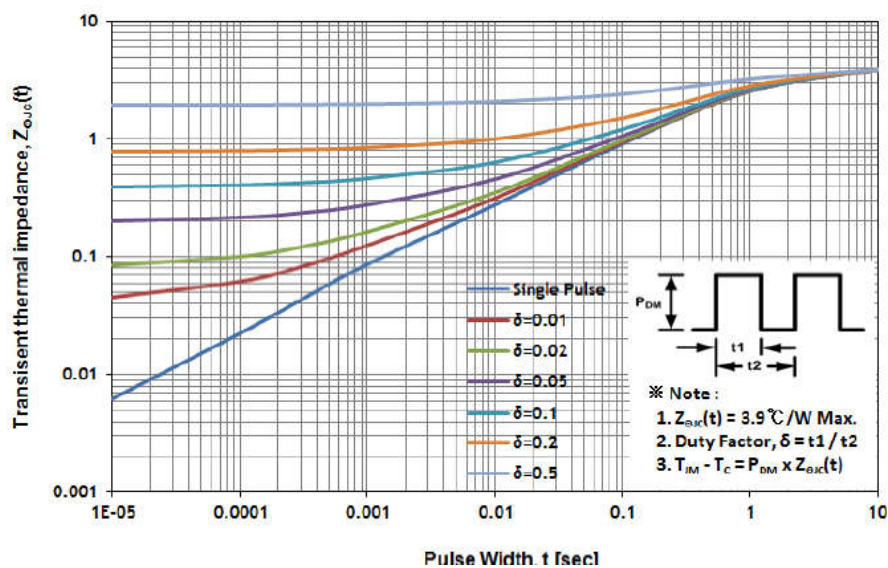


Fig. 12 Gate Charge Test Circuit & Waveform

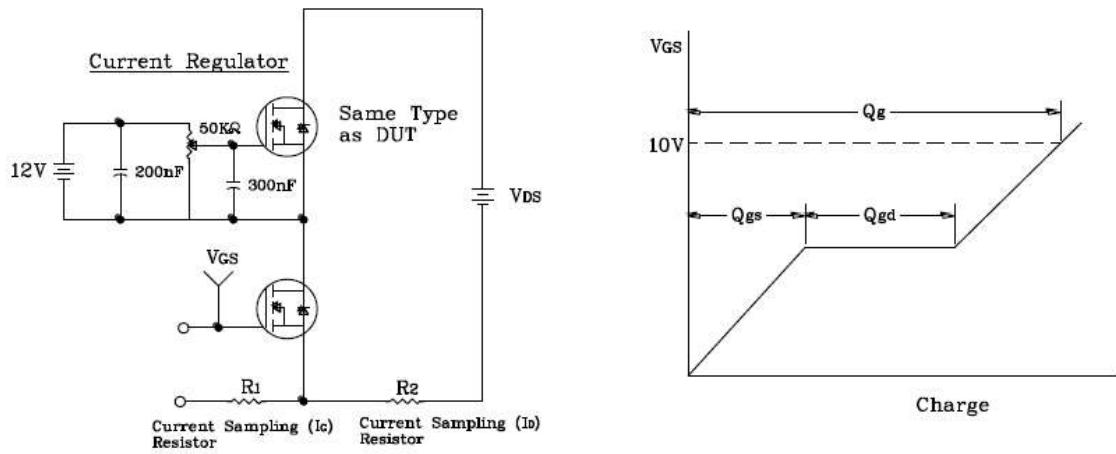


Fig. 13 Resistive Switching Test Circuit & Waveform

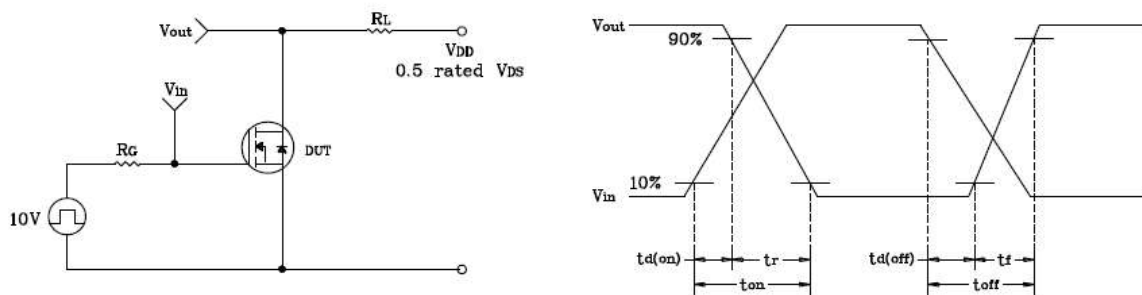


Fig. 14 E_{AS} Test Circuit & Waveform

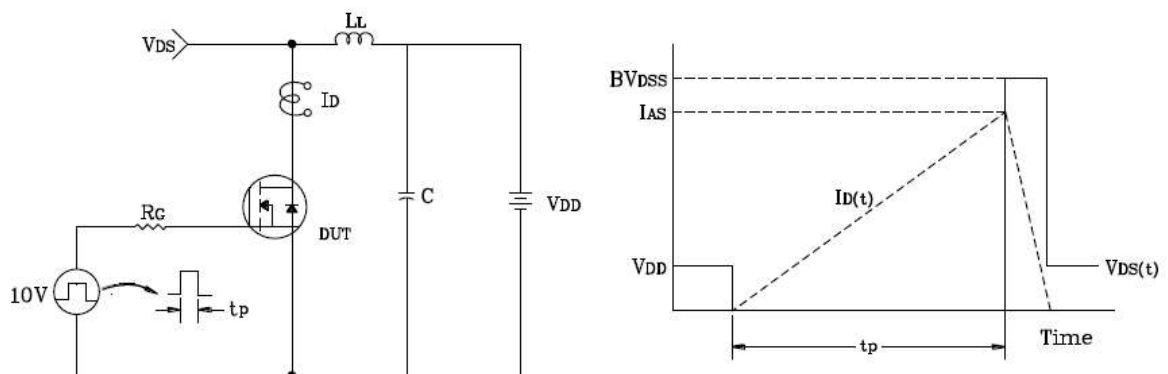
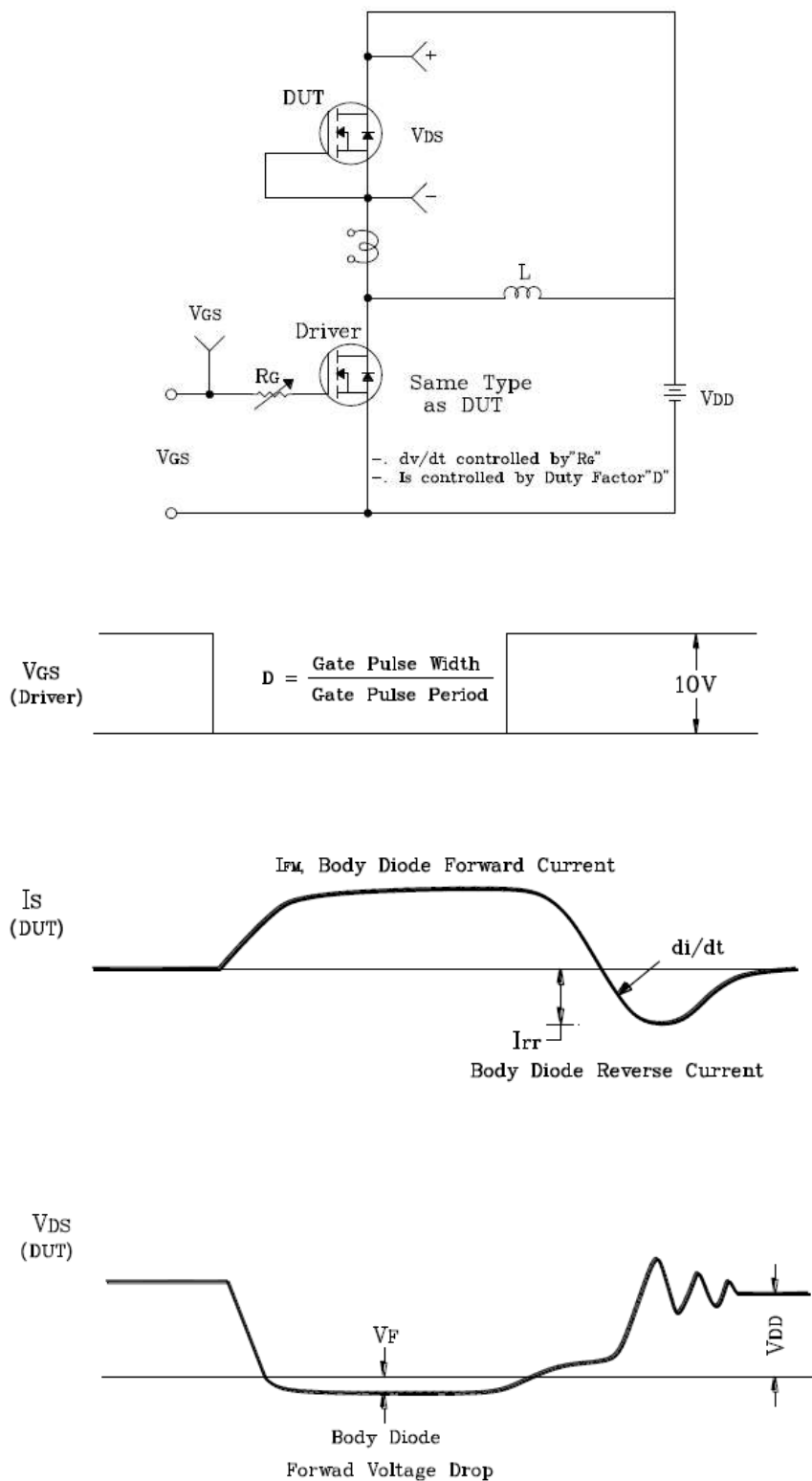
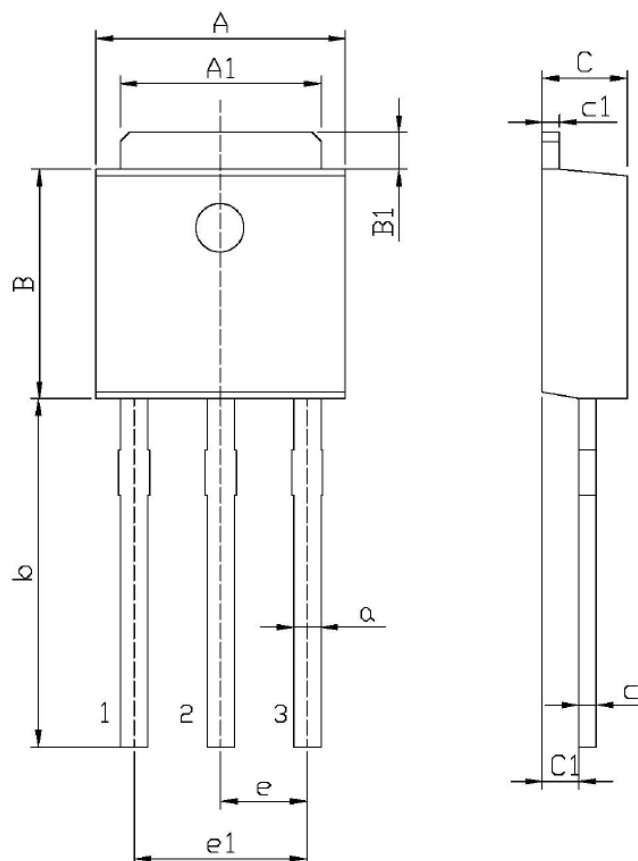


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform



Package Dimensions

TO-251



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	6.45	6.75	a	0.50	0.90
A1	5.10	5.50	b	9.00	9.40
B	5.95	6.25	c	0.45	0.55
B1	0.95	1.25	c1	0.45	0.55
C	2.20	2.40	e	2.24	2.34
C1	0.95	1.15	e1	4.43	4.73

Revision History

No	Date	Contents
0	2022-12-10	Initial Brief Datasheet Release

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