

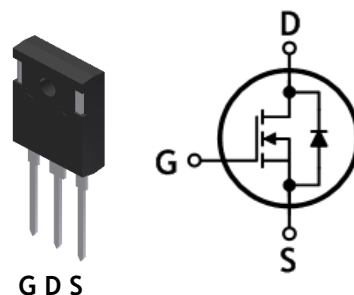
SWITCHING REGULATOR APPLICATION

Features

- 650V Super-junction MOSFET
- Ultra fast body diode: $t_{rr}=140\text{ns}(\text{typ.})$
- Low drain-source On-resistance: $R_{DS(on)}=0.074\Omega (\text{Max.})$
- 100% avalanche tested
- RoHS compliant device

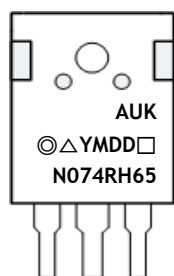
Ordering Information

Part Number	Marking	Package
SJMN074RH65SW	N074RH65	TO-247



TO-247

Marking Information



Column 1: Manufacturer

Column 2: Production Information

e.g.) ◎△YMDD□

-. ◎: Management Code

-. △: Factory Management Code

-. YMDD: Date Code (Year, Month, Daily)

-. □: Factory Management Code

Column 3: Device Code

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

Characteristic	Symbol		Rating	Unit
Drain-source voltage	V _{DSS}		650	V
Gate-source voltage	V _{GSS}		±30	V
Drain current (DC) ^(Note 1)	I _D	T _c =25°C	51	A
		T _c =100°C	32	A
Drain current (Pulsed) ^(Note 1)	I _{DM}		204	A
Single pulsed avalanche energy ^(Note 2)	E _{AS}		702	mJ
Repetitive avalanche current ^(Note 1)	I _{AR}		11	A
Repetitive avalanche energy ^(Note 1)	E _{AR}		30	mJ
Power dissipation	P _D		300	W
Diode dv/dt ruggedness ^(Note 3)	dv/dt		50	V/ns
MOSFET dv/dt ruggedness ^(Note 4)	dv/dt		50	V/ns
Junction temperature	T _J		150	°C
Storage temperature range	T _{stg}		-55~150	°C

Thermal Characteristics

Characteristic	Symbol	Rating	Unit
Thermal resistance, junction to case	$R_{th(j-c)}$	Max. 0.417	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 50	

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	650	-	-	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}	$V_{DS}=650\text{V}$, $V_{GS}=0\text{V}$	-	-	10	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 30\text{V}$	-	-	± 100	nA
Drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=19.4\text{A}$	-	0.063	0.074	Ω
Internal gate resistance	R_g	$f=1\text{MHz}$, Open drain	-	12	-	Ω
Input capacitance	C_{iss}	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$	-	4812	-	pF
Output capacitance	C_{oss}		-	147	-	
Reverse transfer capacitance	C_{rss}		-	3.5	-	
Turn-on delay time (Note 5)	$t_{d(on)}$	$V_{DD}=400\text{V}$, $I_D=19.4\text{A}$, $R_G=10\Omega$, $V_{GS}=10\text{V}$	-	180	-	ns
Rise time (Note 5)	t_r		-	120	-	
Turn-off delay time (Note 5)	$t_{d(off)}$		-	200	-	
Fall time (Note 5)	t_f		-	9	-	
Total gate charge (Note 6)	Q_g	$V_{DS}=400\text{V}$, $V_{GS}=10\text{V}$, $I_D=38.8\text{A}$	-	95	-	nC
Gate-source charge (Note 6)	Q_{gs}		-	35	-	
Gate-drain charge (Note 6)	Q_{gd}		-	47	-	
Gate plateau voltage (Note 6)	$V_{plateau}$		-	7.4	-	V

Source-Drain Diode Ratings and Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Source current (DC)	I_S	Integral reverse diode in the MOSFET	-	-	51	A
Source current (Pulsed)	I_{SM}		-	-	204	A
Forward voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=38.8\text{A}$	-	-	1.5	V
Reverse recovery time (Note 5, 6)	t_{rr}	$I_S=19.4\text{A}$, $V_{GS}=0\text{V}$ $di_S/dt=100\text{A}/\mu\text{s}$	-	140	-	ns
Reverse recovery charge (Note 5, 6)	Q_{rr}		-	0.85	-	μC

Note:

1. Calculated continuous current based on maximum allowable junction temperature
2. $L=10\text{mH}$, $I_{AS}=11\text{A}$, $V_{DD}=90\text{V}$, Starting $T_J=25^{\circ}\text{C}$
3. $I_S \leq 19.4\text{A}$, $V_{DS} \leq 400\text{V}$, $di_S/dt \leq 100\text{A}/\mu\text{s}$, $T_J=25^{\circ}\text{C}$
4. $V_{DS} \leq 0 \dots 400\text{V}$
5. Guaranteed by design, not subject to production testing
6. Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

Typical Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

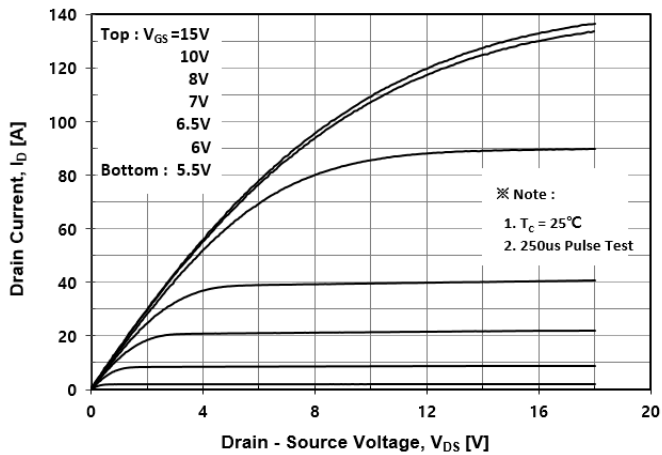


Fig. 2 Typical Transfer Characteristics

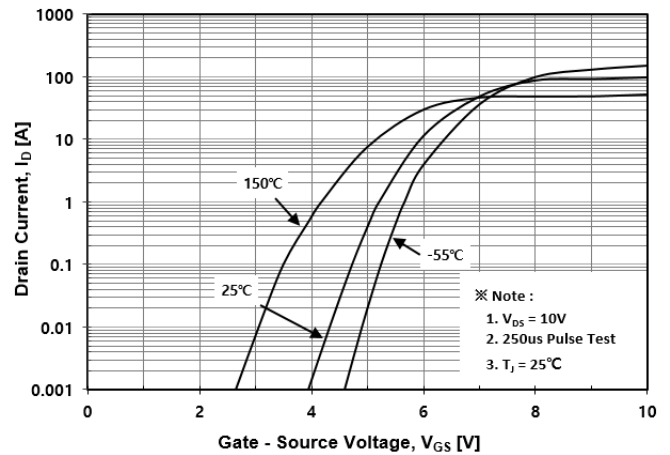


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

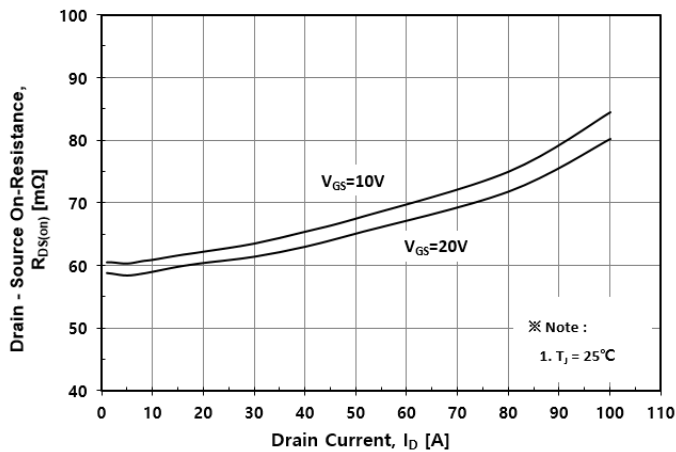


Fig. 4 Body Diode Forward Voltage Variation with Source Current

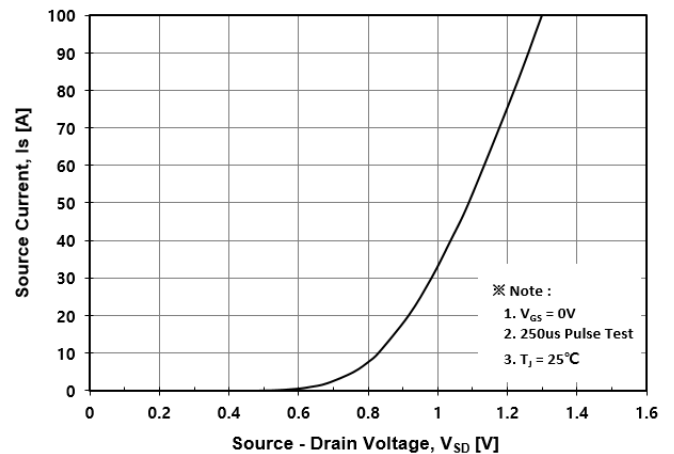


Fig. 5 Typical Capacitance Characteristics

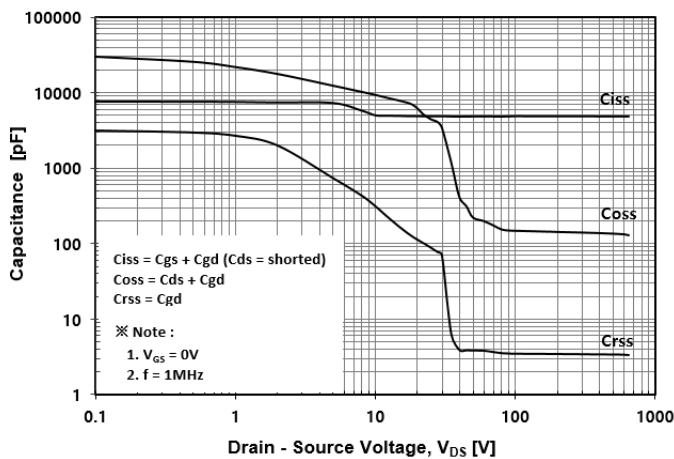
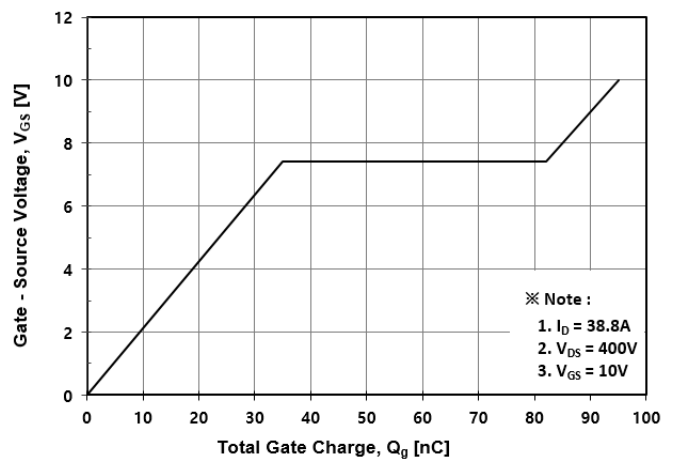


Fig. 6 Typical Total Gate Charge Characteristics



Typical Electrical Characteristics Curves

Fig. 7 Breakdown Voltage Variation vs. Temperature

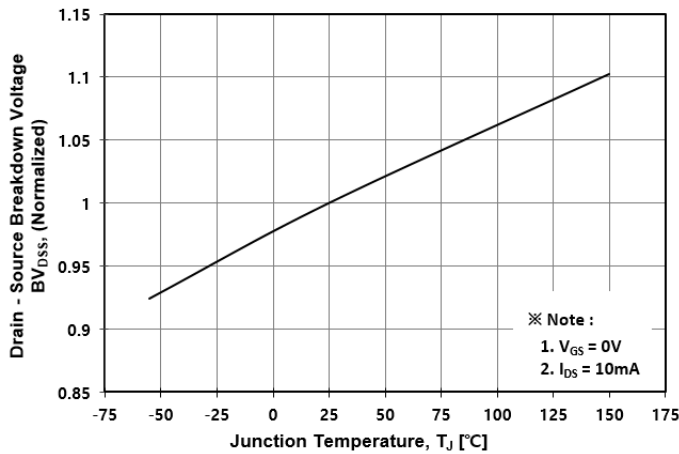


Fig. 8 On-Resistance Variation vs. Temperature

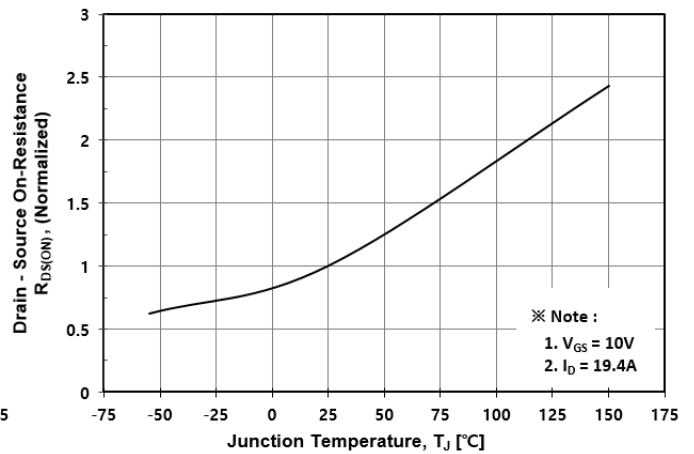


Fig. 9 Maximum Drain Current vs. Case Temperature

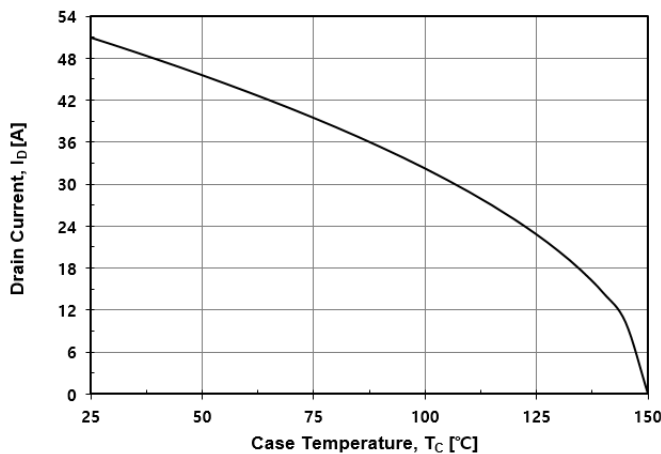


Fig. 10 Maximum Safe Operating Area

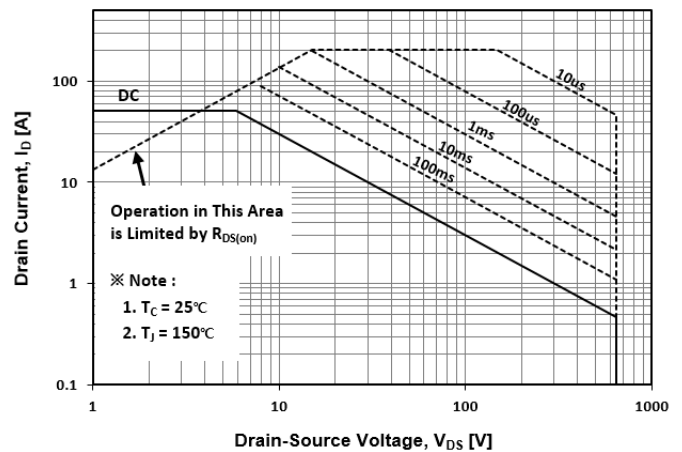


Fig. 11 Transient Thermal Impedance

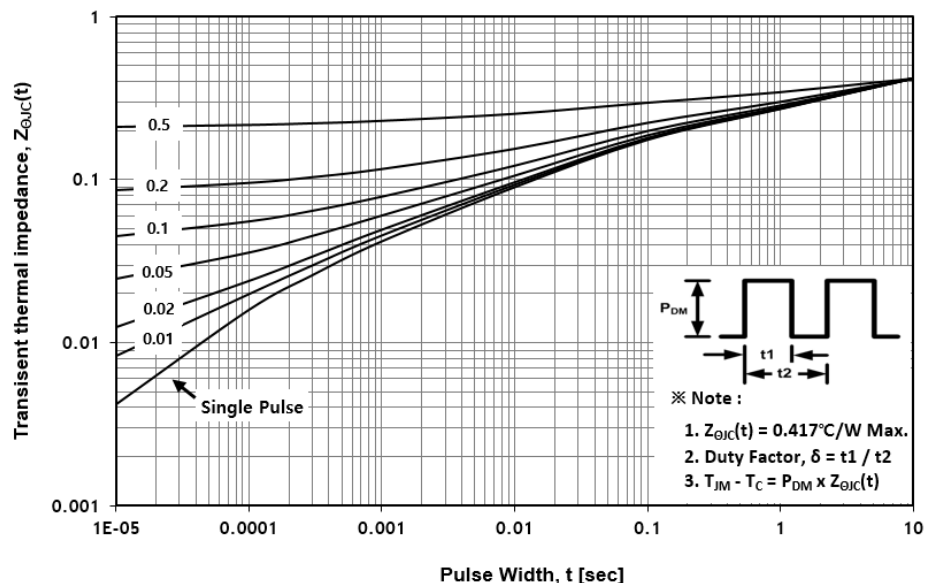


Fig. 12 Gate Charge Test Circuit & Waveform

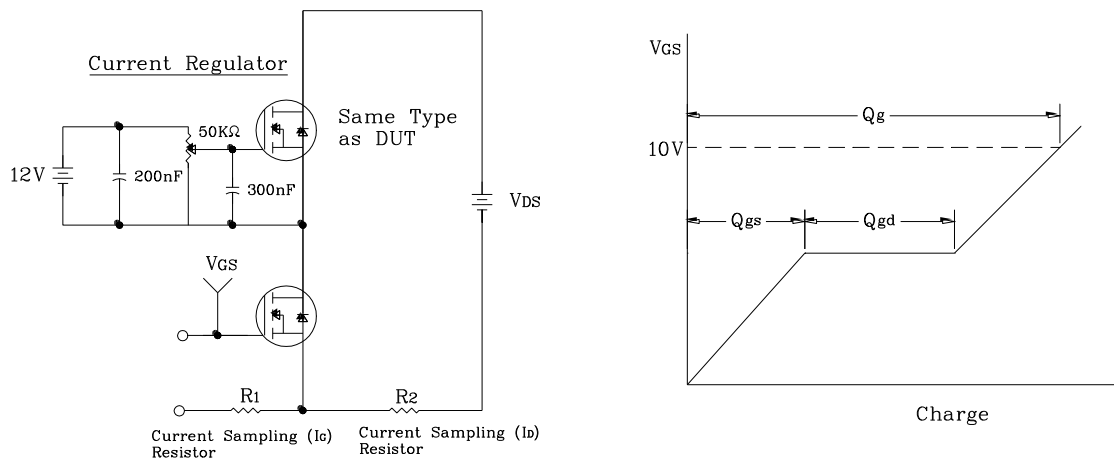


Fig. 13 Resistive Switching Test Circuit & Waveform

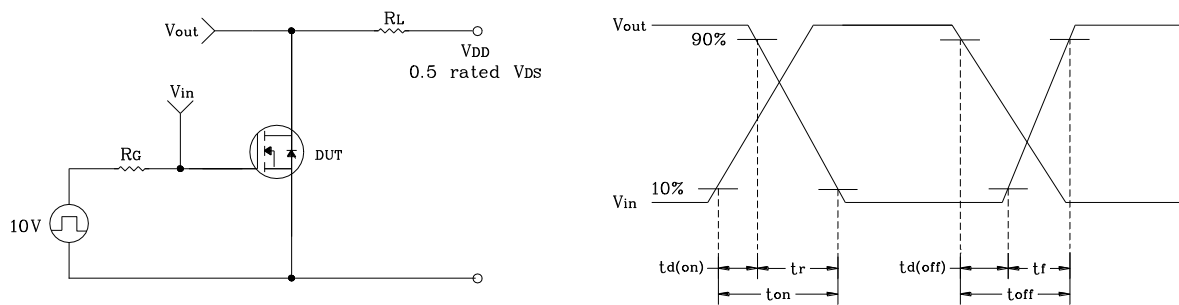


Fig. 14 E_{AS} Test Circuit & Waveform

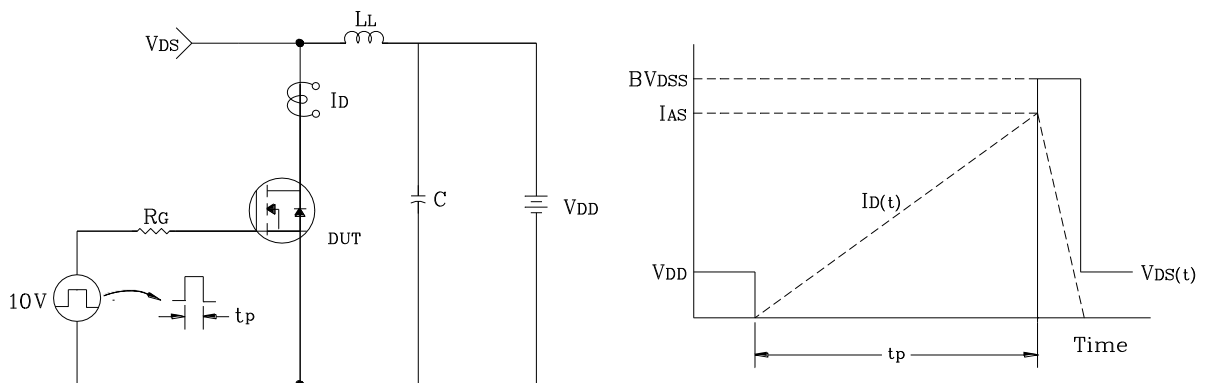
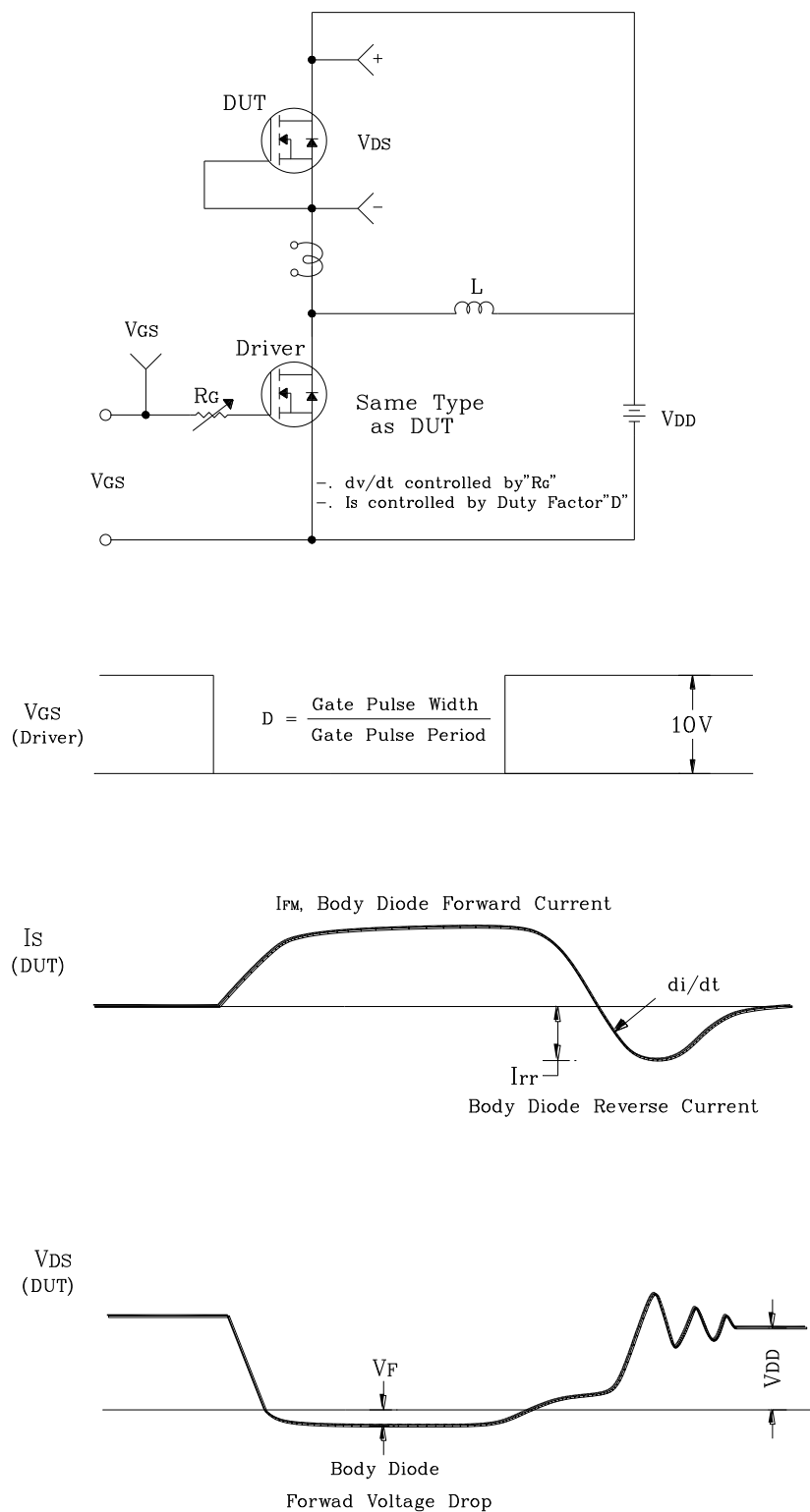
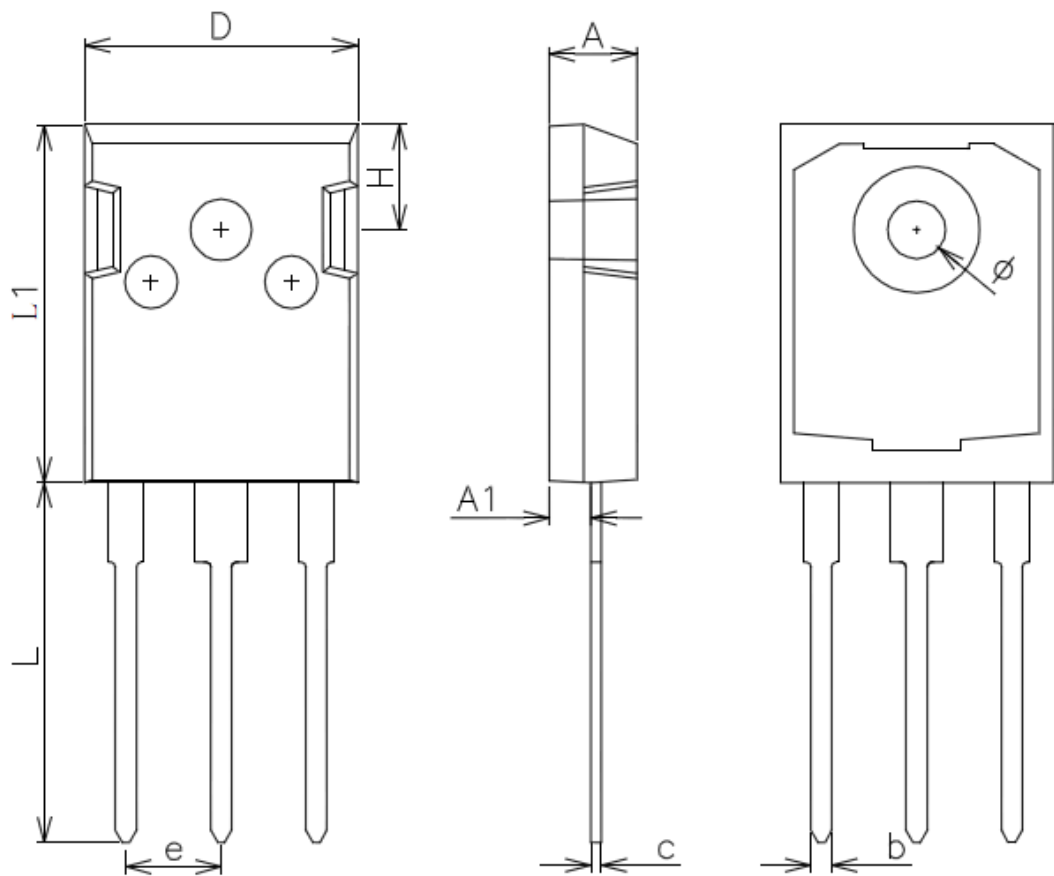


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform



Package Outline Dimensions (Unit: mm)



SYMBOL	MILLIMETERS		
	MIN	Nominal	MAX
A	4.80	5.00	5.20
A1	2.41 REF		
b	1.00	1.20	1.40
c	0.40	0.60	0.80
D	15.60	15.80	16.00
e	5.45 REF		
H	6.15 REF		
L	19.35	19.95	20.55
L1	20.80	21.00	21.20
Ø	3.20	3.50	3.80

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