

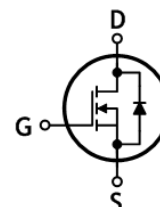
N-Channel Super Junction MOSFET

Features

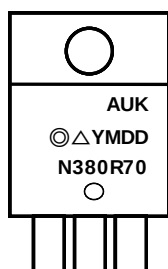
- Drain-Source voltage: $V_{DS}=750V$ ($@T_J=150^{\circ}C$)
- Low drain-source On resistance: $R_{DS(on)}=0.38\Omega$ (Max.)
- Ultra low gate charge: $Q_g=20nC$ (Typ.)
- RoHS compliant device
- 100%avalanche tested

Ordering Information

Part Number	Marking	Package
SJMN380R70F	N380R70	TO-220F-3L


TO-220F-3L

Marking Information



Column 1: Manufacturer

Column 2: Production Information

e.g.) ◎△YMDD

-.. ◎△: Factory Management Code

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

Column 3: Device Code

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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	700	V
Gate-source voltage	V_{GSS}	± 30	V
Drain current (DC) (Note 1)	I_D	$T_C=25^{\circ}C$	11
		$T_C=100^{\circ}C$	7
Drain current (Pulsed) (Note 1)	I_{DM}	44	A
Single pulsed avalanche energy (Note 2)	E_{AS}	263	mJ
Repetitive avalanche current (Note 1)	I_{AR}	7	A
Repetitive avalanche energy (Note 1)	E_{AR}	3.2	mJ
Power dissipation	P_D	32	W
Diode dv/ dt ruggedness (Note 3)	dv/ dt	15	V/ ns
MOSFET dv/ dt ruggedness (Note 4)	dv/ dt	50	V/ ns
Junction temperature	T_J	150	$^{\circ}C$
Storage temperature range	T_{stg}	-55~150	$^{\circ}C$

Thermal Characteristics

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0$	700	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}$, $V_{DS}=V_{GS}$	2	3	4	V
Drain-source cut-off current	I_{DSS}	$V_{DS}=700\text{V}$, $V_{GS}=0\text{V}$	-	-	1	μA
		$V_{DS}=560\text{V}$, $T_J=125^{\circ}\text{C}$	-	-	10	μA
Gate leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 30\text{V}$	-	-	± 100	nA
Drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=5.5\text{A}$	-	0.3	0.38	Ω
Internal gate resistance	R_g	$f=1\text{MHz}$, Open drain	-	20	-	Ω
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1\text{MHz}$	-	858	-	pF
Output capacitance	C_{oss}		-	470	-	
Reverse transfer capacitance	C_{rss}		-	21	-	
Turn-on delay time (Note 5)	$t_{d(on)}$	$V_{DS}=350\text{V}$, $I_D=11\text{A}$, $R_g=25\Omega$	-	17	-	ns
Rise time (Note 5)	t_r		-	14	-	
Turn-off delay time (Note 5)	$t_{d(off)}$		-	40	-	
Fall time (Note 5)	t_f		-	5	-	
Total gate charge (Note 6)	Q_g	$V_{DS}=400\text{V}$, $V_{GS}=10\text{V}$, $I_D=6\text{A}$	-	20	-	nC
Gate-source charge (Note 6)	Q_{gs}		-	6.5	-	
Gate-drain charge (Note 6)	Q_{gd}		-	5.5	-	

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	-	-	11	A
Source current (Pulsed)	I_{SM}		-	-	44	A
Forward voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=11\text{A}$	-	-	1.2	V
Reverse recovery time (Note 5, 6)	t_{rr}	$I_S=11\text{A}$, $V_{GS}=0\text{V}$, $dI/dt=100\text{A}/\mu\text{s}$	-	270	-	ns
Reverse recovery charge (Note 5, 6)	Q_{rr}		-	2.8	-	μC

Note:

1. Calculated continuous current based on maximum allowable junction temperature
2. $L=10\text{mH}$, $I_{AS}=7\text{A}$, $V_{DD}=50\text{V}$, Starting $T_J=25^{\circ}\text{C}$
3. $I_S \leq 11\text{A}$, $V_{DS} \leq 400\text{V}$, $dI/dt \leq 100\text{A}/\mu\text{s}$, $T_J=25^{\circ}\text{C}$
4. $V_{DS} \leq 400\text{V}$, $I_S \leq 11\text{A}$
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

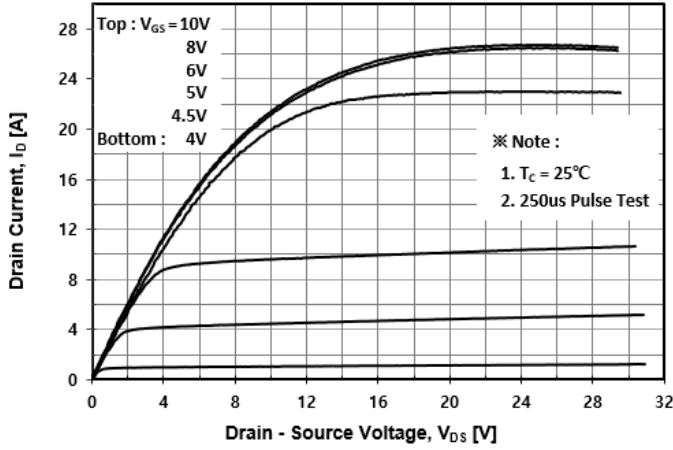


Fig. 2 Typical Transfer Characteristics

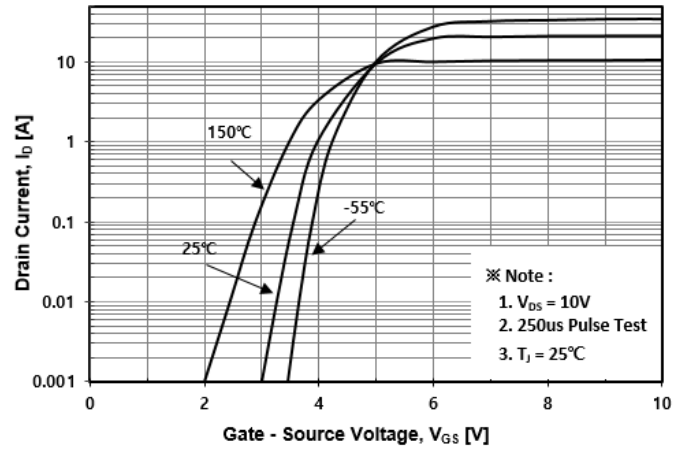


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

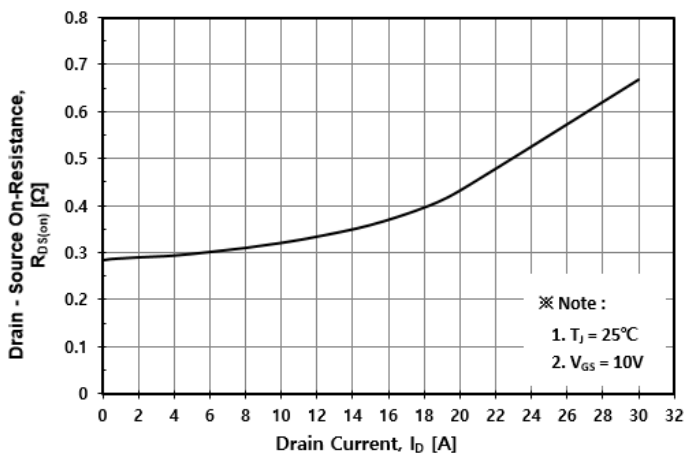


Fig. 4 Body Diode Forward Voltage Variation with Source Current

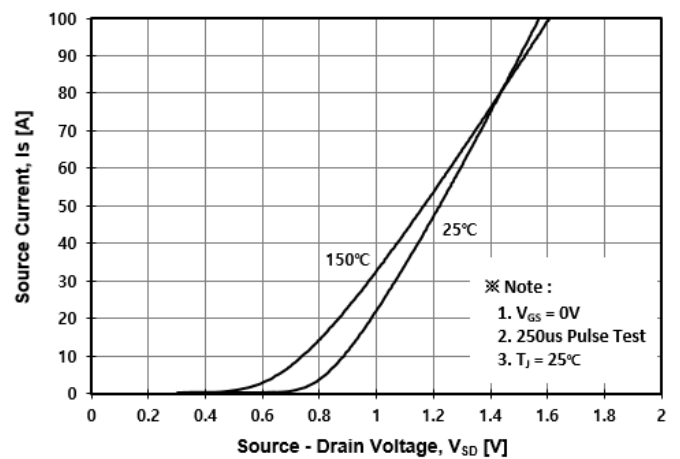


Fig. 5 Typical Capacitance Characteristics

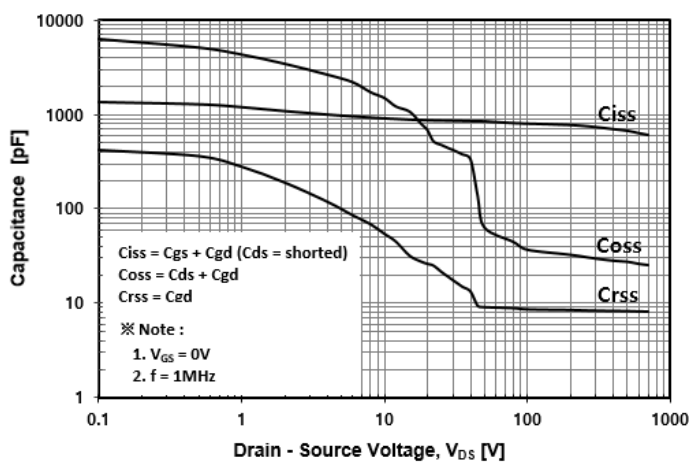


Fig. 6 Typical Total Gate Charge Characteristics

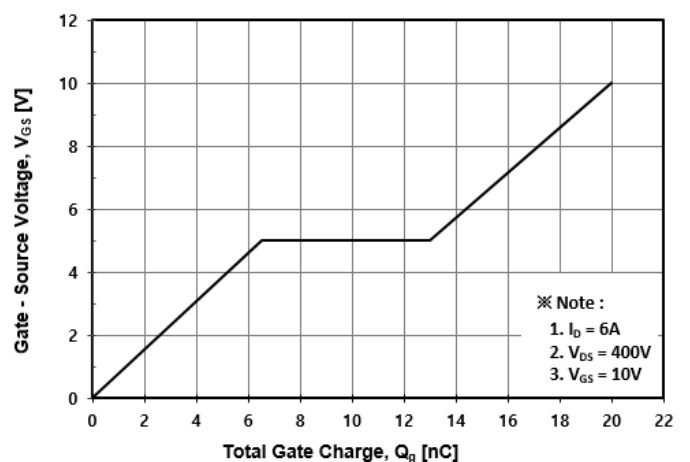


Fig. 7 Breakdown Voltage Variation vs. Temperature

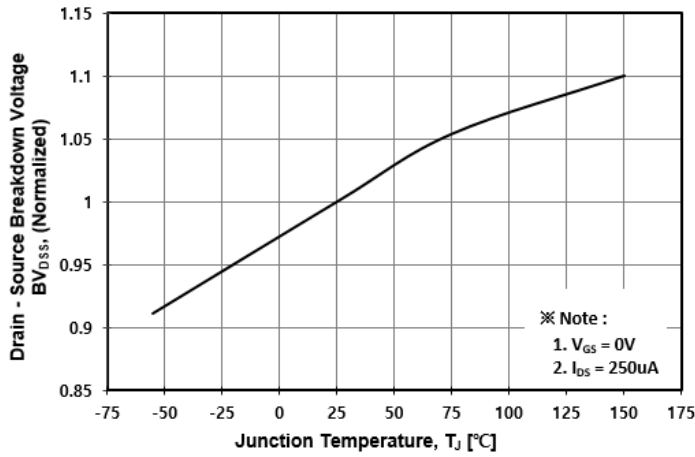


Fig. 8 On-Resistance Variation vs. Temperature

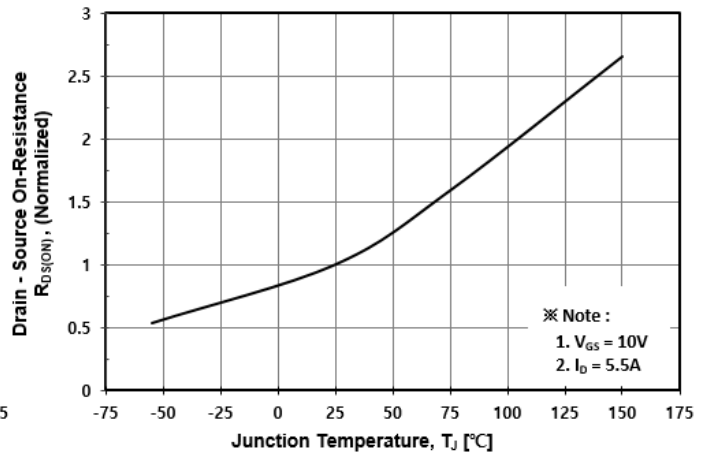


Fig. 9 Maximum Drain Current vs. Case Temperature

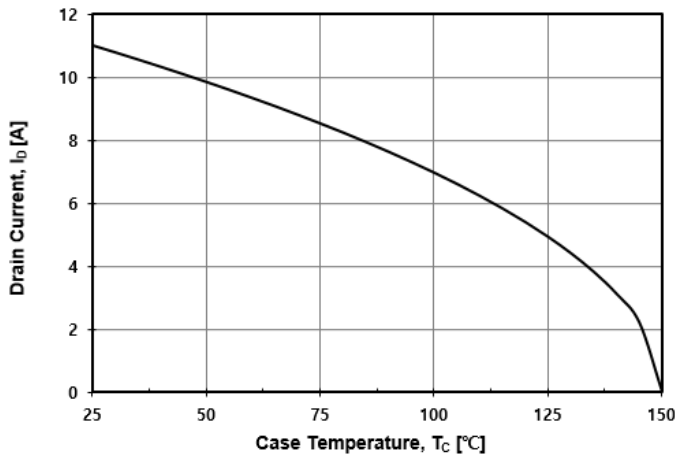


Fig. 10 Maximum Safe Operating Area

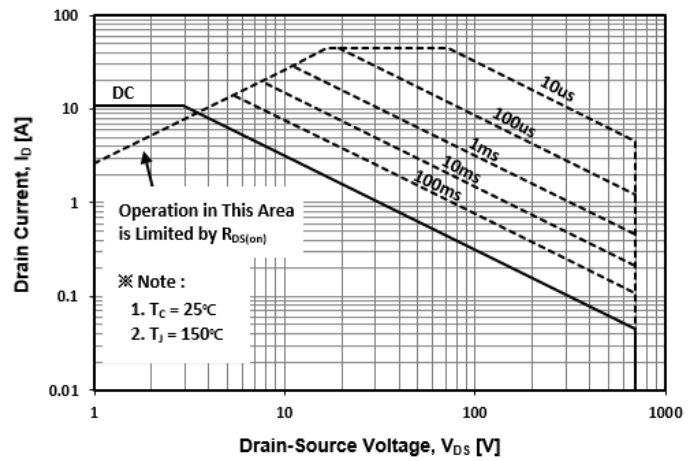


Fig. 11 Transient Thermal Impedance

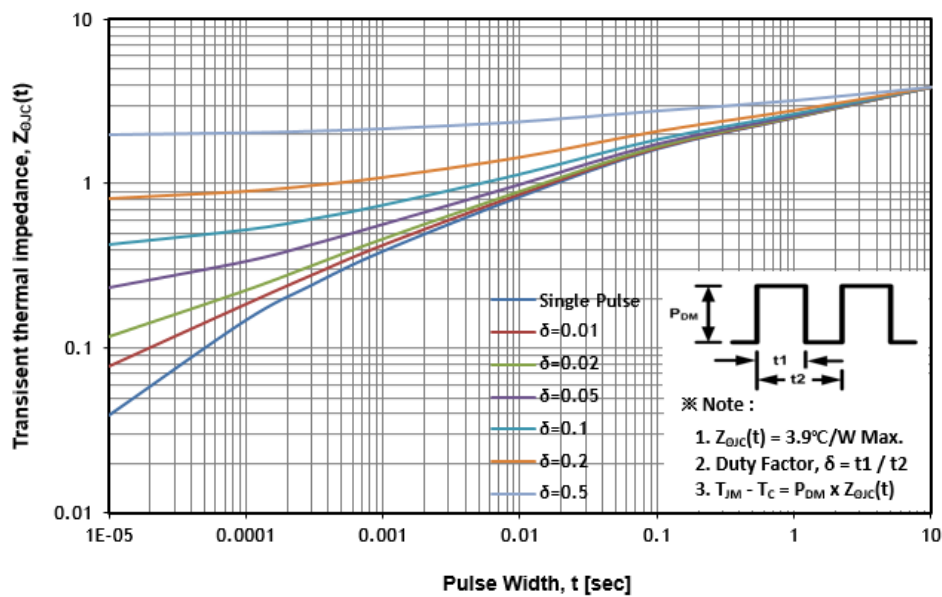


Fig. 12 Gate Charge Test Circuit & Waveform

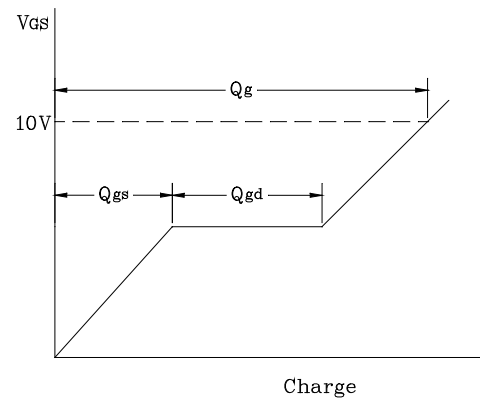
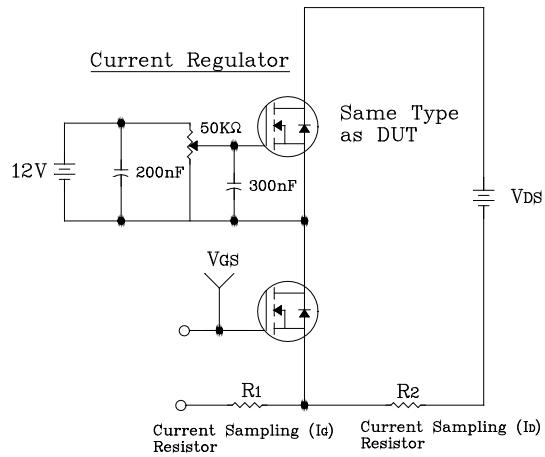


Fig. 13 Resistive Switching Test Circuit & Waveform

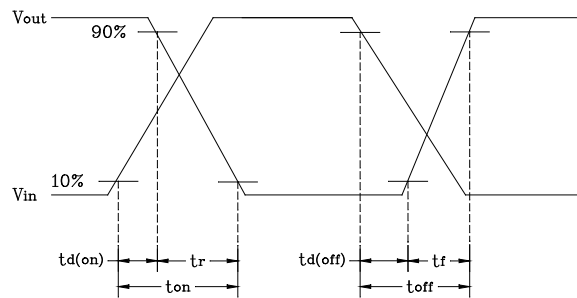
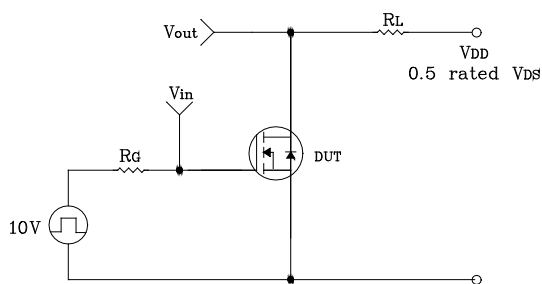


Fig. 14 E_{AS} Test Circuit & Waveform

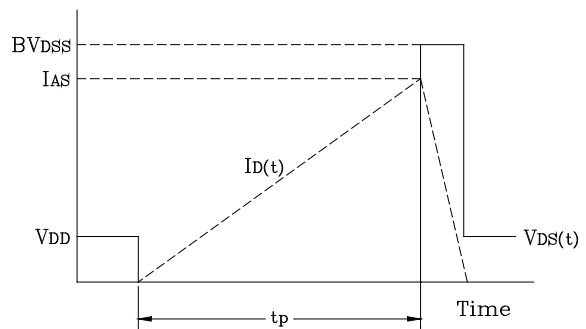
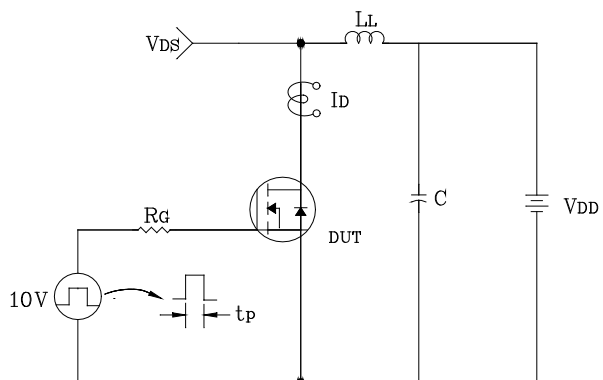
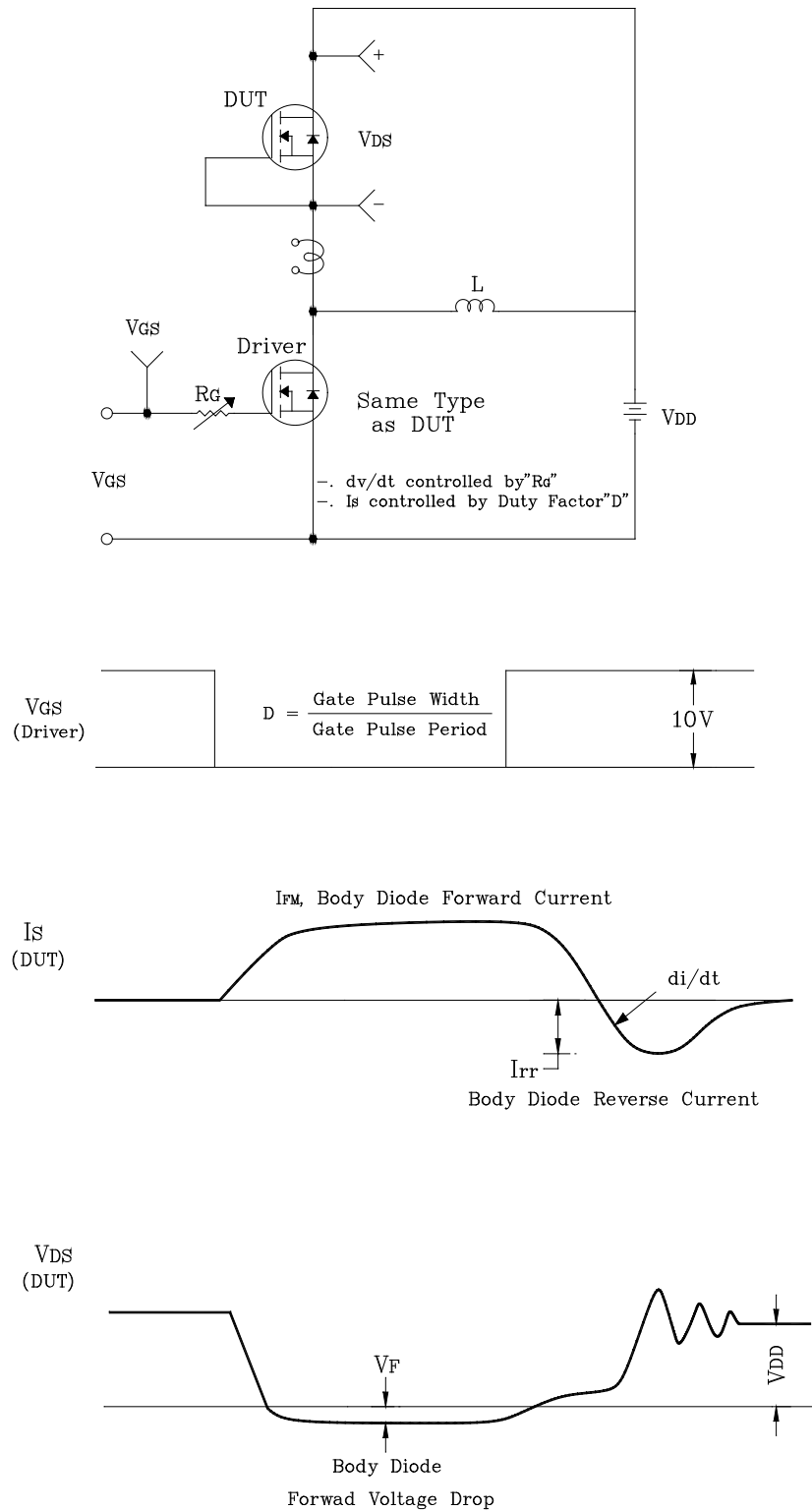
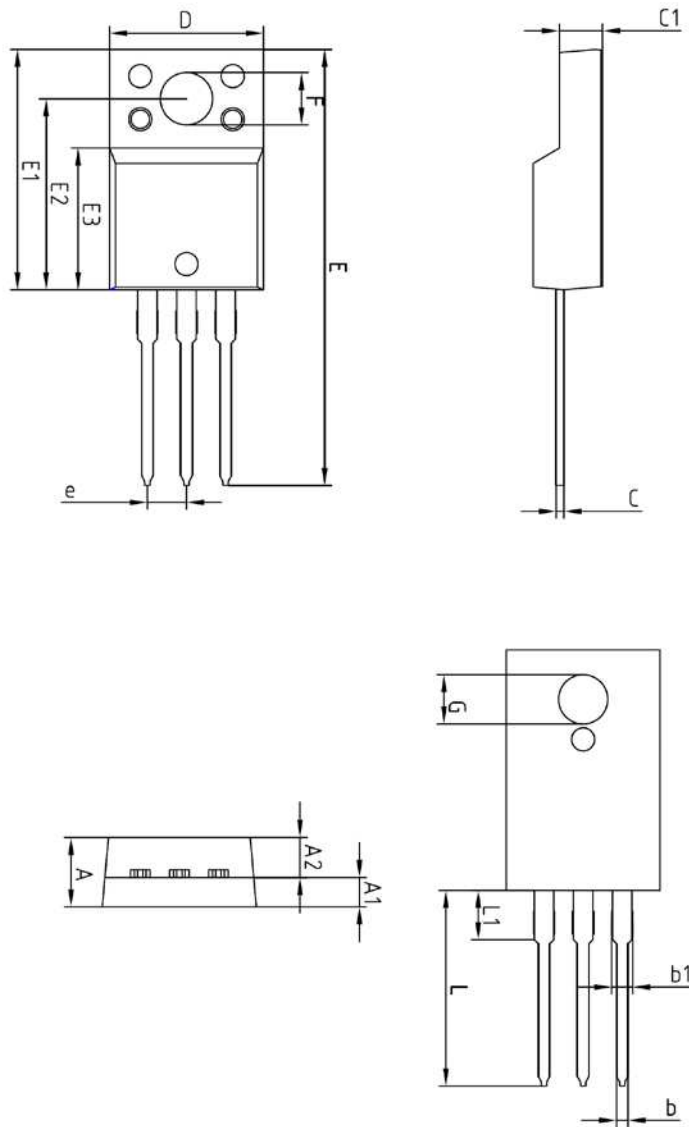


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform



Package Outline Dimensions



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	—	—	4.60	
A1	2.45	2.50	2.55	
A2	1.95	2.00	2.05	
b	0.65	0.75	0.85	
b1	1.07	1.27	1.47	
C	0.40	0.50	0.60	
C1	2.70	2.80	2.90	
D	9.90	10.00	10.10	
E	28.00	—	28.60	
E1	15.50	15.60	15.70	
E2	12.30	12.40	12.50	
E3	9.15	9.20	9.25	
F	3.30	3.40	3.50	
G	3.10	3.20	3.30	
e	2.54 BSC			
L	12.40	—	13.00	
L1	3.46 BSC			

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