产品规格书

批 准	审 核	校 核	编 制
纪春华	朴致均	赵宇辉	郑羿
2019.07.16	2019.07.16	2019.07.16	2019.07.16

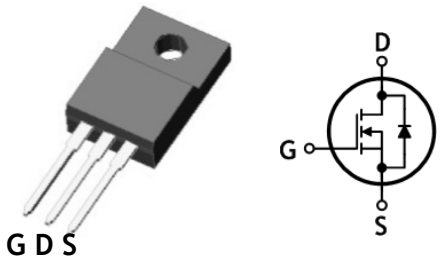
规格书更改履历：

序号	更改内容	履历号	更改时间	责任人
1	新规制定	000	2019.07.16	郑羿

N-Channel Super Junction MOSFET

Features

- Drain-Source voltage: V_{DS}=650V (T_J=25°C)
- Low drain-source On resistance: $R_{DS(on)}$=0.19Ω (Max.)
- Ultra low gate charge: Qg=20nC(Typ.)
- RoHS compliant device
- 100% avalanche tested

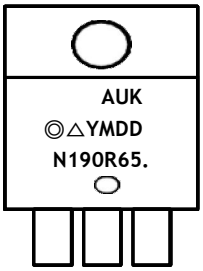


TO-220F-3L

Ordering Information

Part Number	Marking	Package
KJMN190R65FA	N190R65.	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 . Dalian

Absolute maximum ratings (T_C=25°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	20	A
		T_c=100°C	12.6	A
Drain current (Pulsed) (Note 1)	I_{DM}		80	A
Single pulsed avalanche energy (Note 2)	E_{AS}		265	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
Junction temperature	T_J		150	°C
Storage temperature range	T_{stg}		-55~150	°C

* Limited only maximum junction temperature

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°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	I_D=250uA, V_{GS}=0	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250uA, V_{DS}=V_{GS}	2	3	4	V
Drain-source cut-off current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	-	-	1	uA
		V_{DS}=650V, T_J=125°C	-	-	100	uA
Gate leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V	-	-	±100	nA
Drain-source on-resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	-	0.19	Ω
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	1533	-	pF
Output capacitance	C_{oss}		-	846	-	
Reverse transfer capacitance	C_{rss}		-	23	-	
Turn-on delay time (Note 3)	$t_{d(on)}$	V_{DS}=350V, I_D=20A, R_G=25Ω	-	25	-	ns
Rise time (Note 3)	t_r		-	21	-	
Turn-off delay time (Note 3)	$t_{d(off)}$		-	60	-	
Fall time (Note 3)	t_f		-	4	-	
Total gate charge (Note 4)	Q_g	V_{DS}=400V, V_{GS}=10V, I_D=10A	-	36	-	nC
Gate-source charge (Note 4)	Q_{gs}		-	10	-	
Gate-drain charge (Note 4)	Q_{gd}		-	10	-	

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	-	-	20	A
Source current (Pulsed)	I_{SM}		-	-	80	A
Forward voltage	V_{SD}	V_{GS}=0V, I_S=20A	-	-	1.2	V
Reverse recovery time (Note 3,4)	t_{rr}	I_S=20A, V_{GS}=0V, dI_S/dt=100A/us	-	383	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	4.6	-	uC

Note:
1. Calculated continuous current based on maximum allowable junction temperature
2. L=10mH, I_{AS}=7A, V_{DD}=50V, Starting T_J=25°C
3. Guaranteed by design, not subject to production testing
4. Pulse test: Pulse width≤300us, Duty cycle≤2%

Typical Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

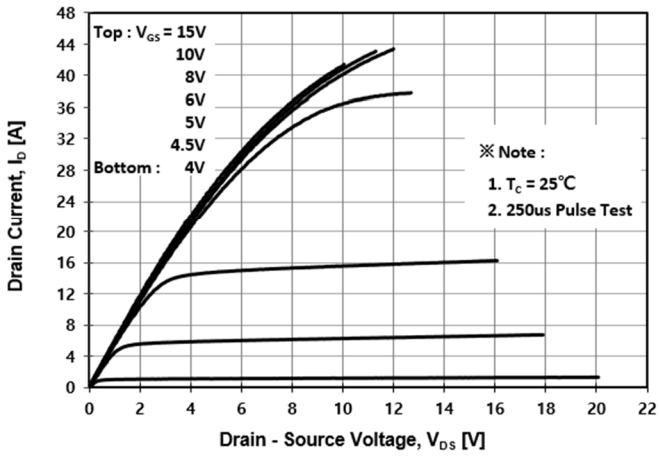


Fig. 2 Typical Transfer Characteristics

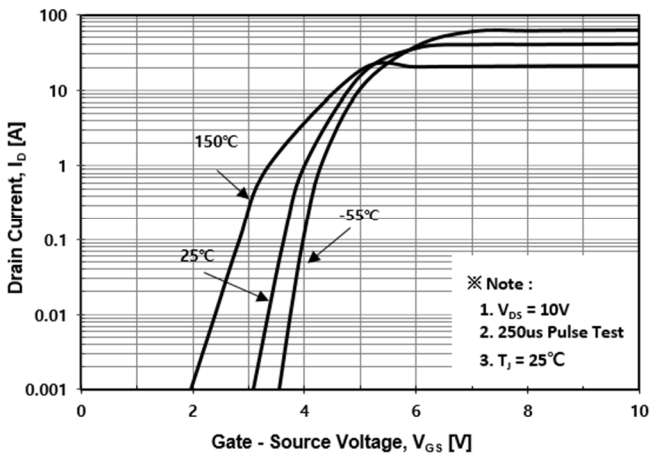


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

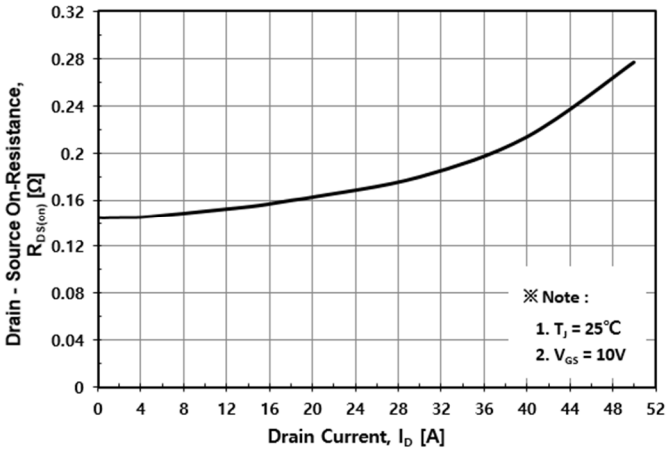


Fig. 4 Body Diode Forward Voltage Variation with Source Current

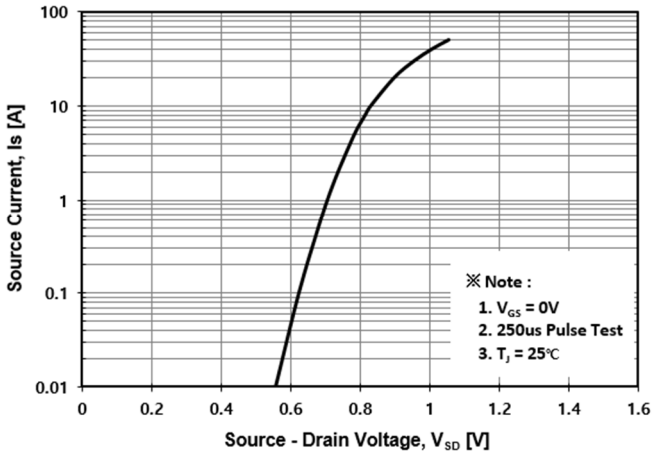


Fig. 5 Typical Capacitance Characteristics

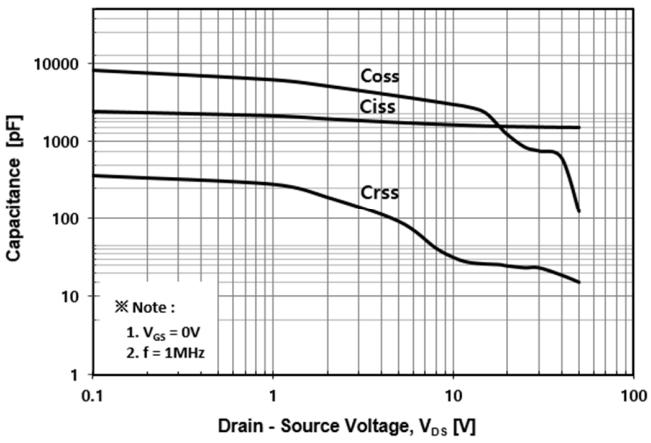


Fig. 6 Typical Total Gate Charge Characteristics

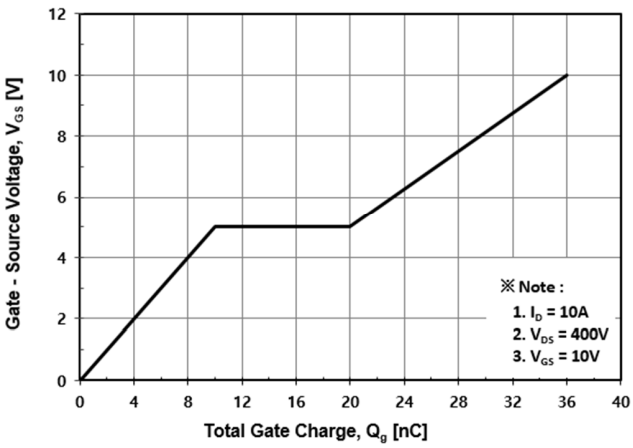


Fig. 7 Breakdown Voltage Variation vs. Temperature

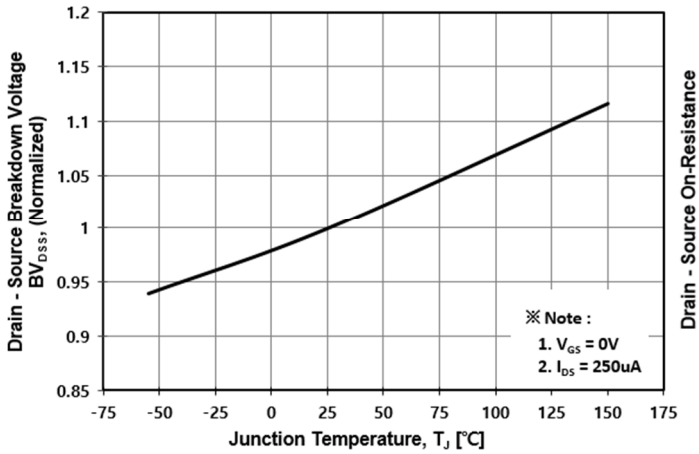


Fig. 8 On-Resistance Variation vs. Temperature

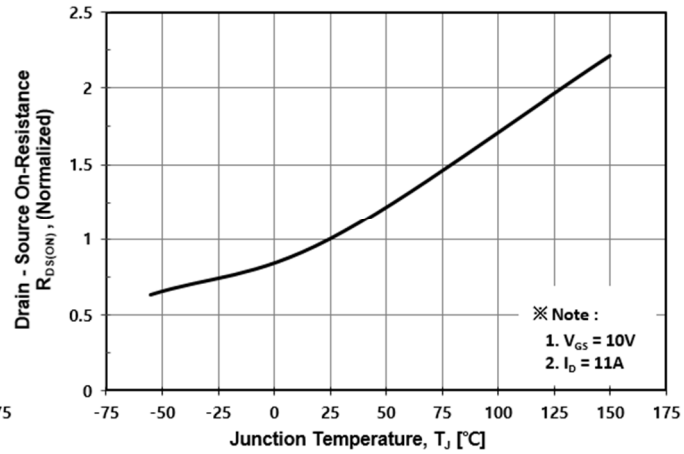


Fig. 9 Maximum Drain Current vs. Case Temperature

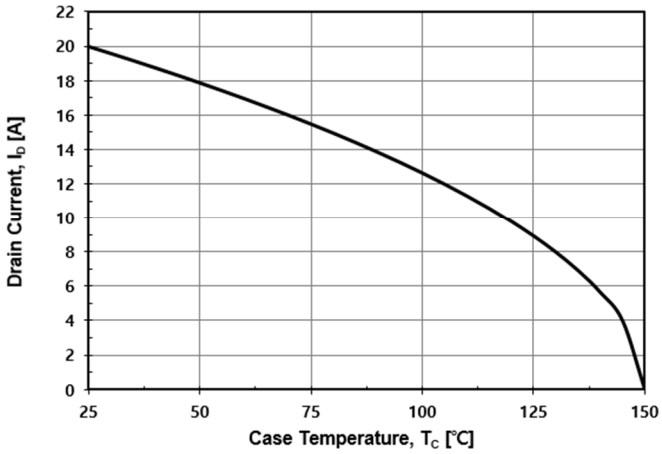


Fig. 10 Maximum Safe Operating Area

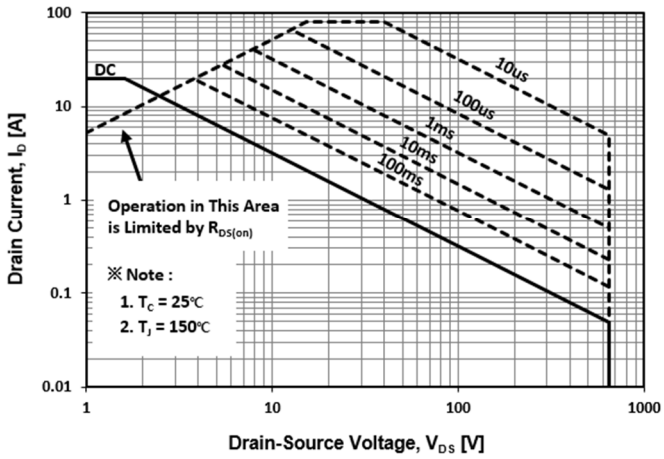


Fig. 11 Transient Thermal Impedance

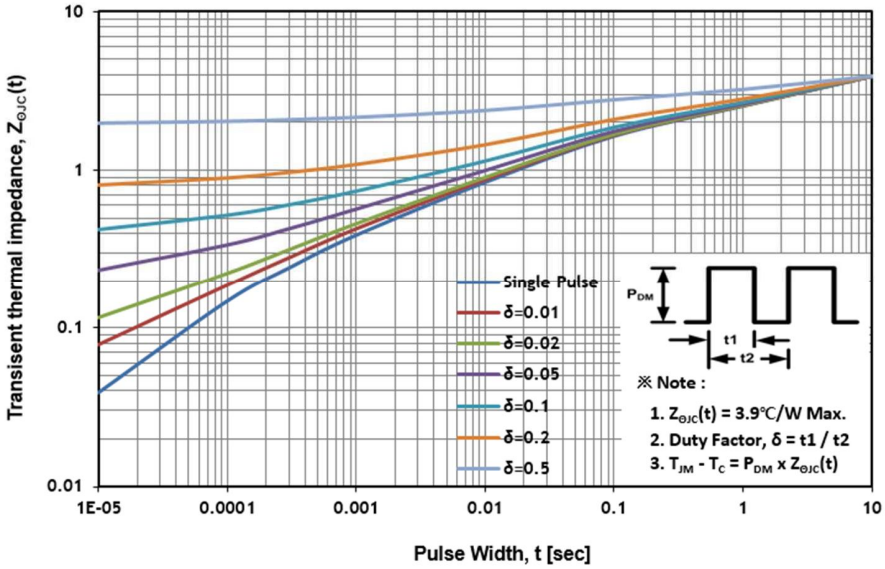


Fig. 12 Gate Charge Test Circuit & Waveform

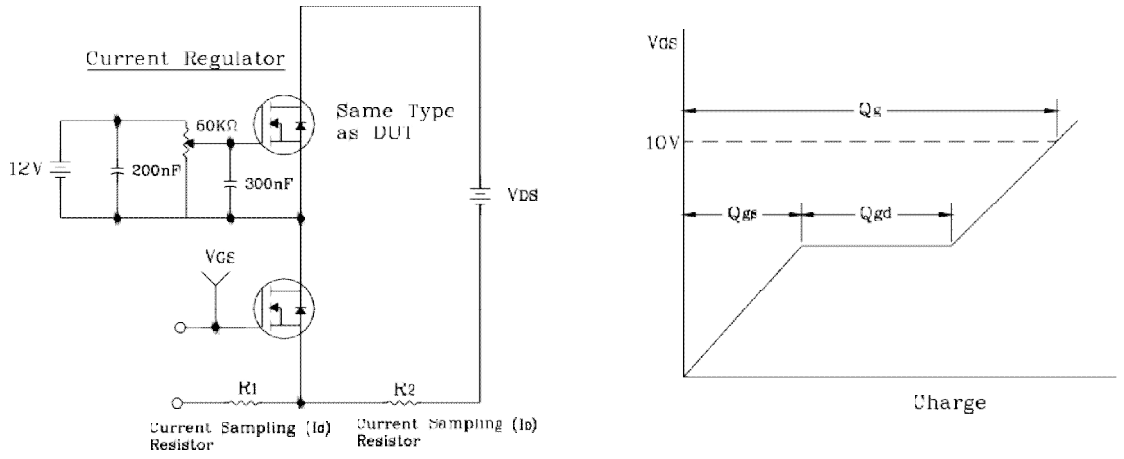


Fig. 13 Resistive Switching Test Circuit & Waveform

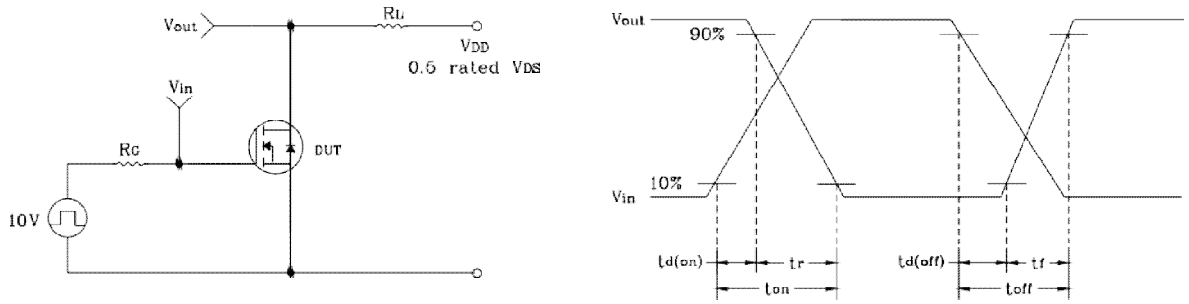


Fig. 14 E_{AS} Test Circuit & Waveform

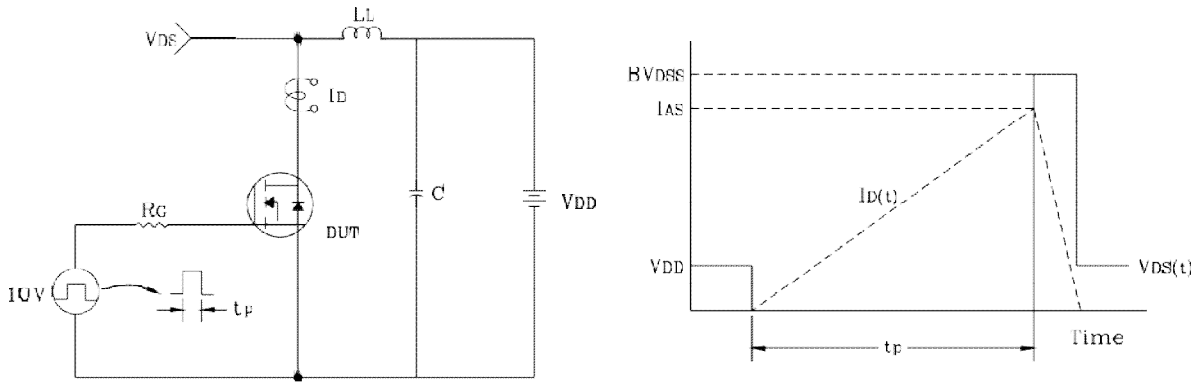
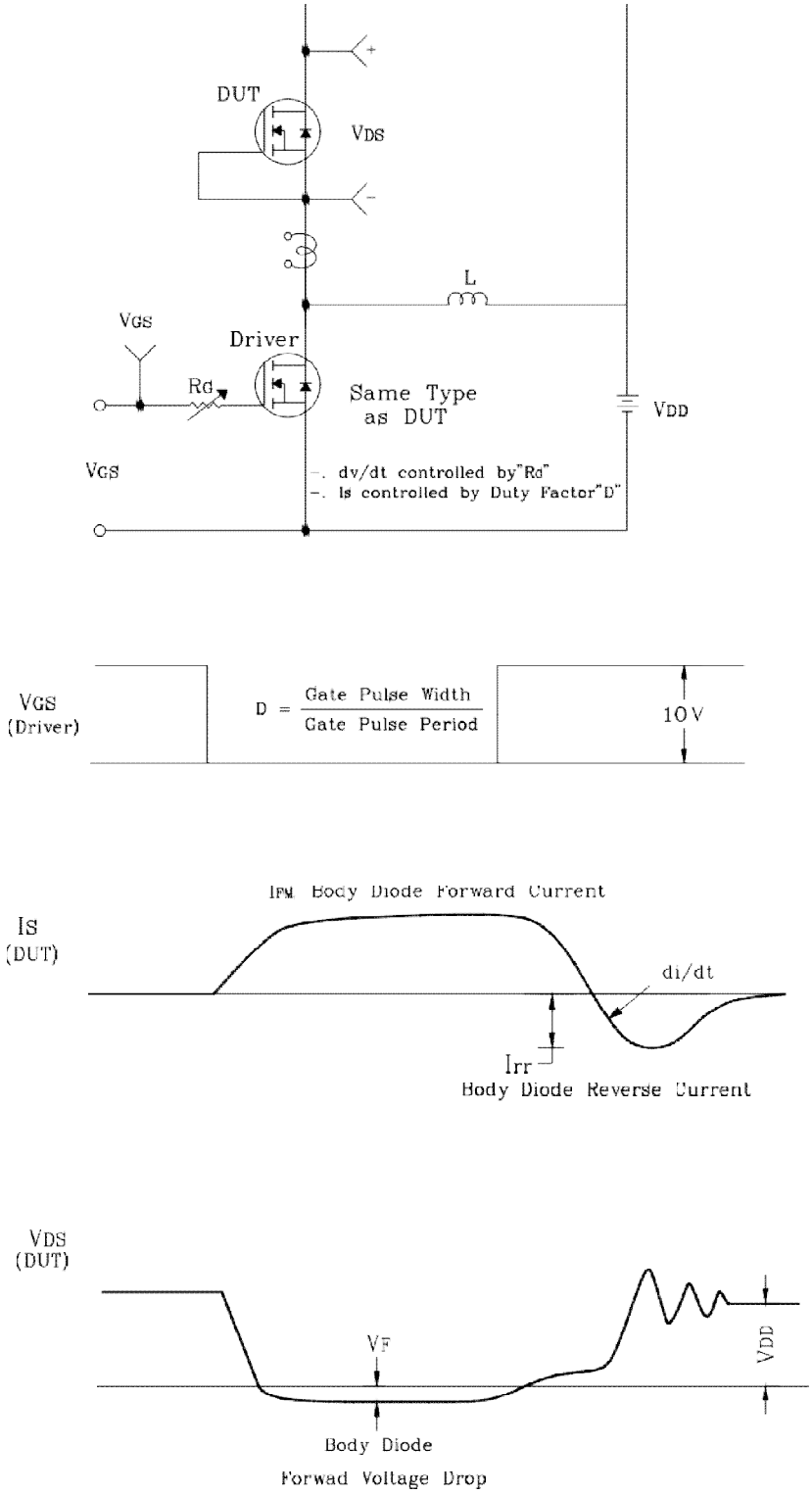
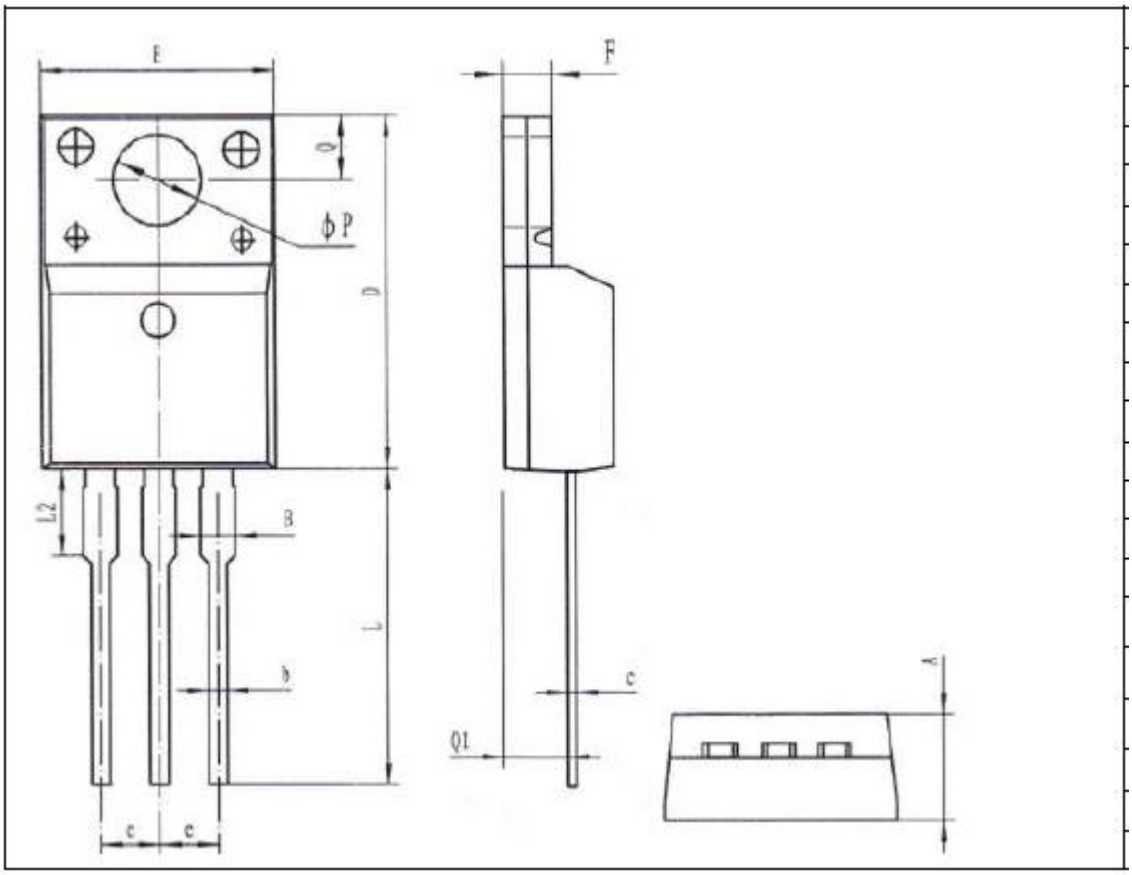


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform



Package Outline Dimensions



符号 Symbol	最小值 Min	典型值 Typ	最大值 Max
A	4.50		4.90
B			1.47
b	0.70		0.90
C	0.45		0.60
D	15.67		16.07
E	9.96		10.36
e		2.54	
F	2.34		2.74
L	12.58		13.38
L2	3.25		3.75
Q	3.20		3.40
Q1	2.56		2.96
ΦP	3.08		3.28

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