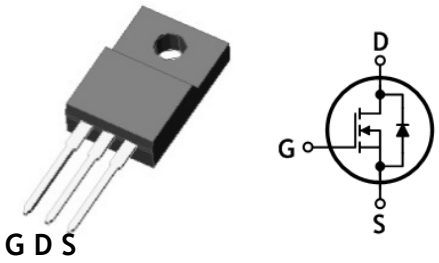
N-Channel Super Junction MOSFET

Features

- Drain-Source voltage: V_{DS}=650V (@T_J=150°C)
- Low drain-source On resistance: $R_{DS(on)}$=0.12Ω (Typ.)
- Ultra low gate charge: Qg=62nC(Typ.)
- RoHS compliant device
- 100% avalanche tested

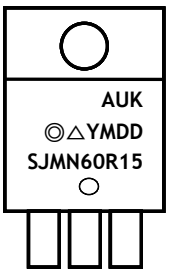


TO-220F-3L

Ordering Information

Part Number	Marking	Package
SJMN60R15F	SJMN60R15	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°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) (Note 1)	I_D	T_c=25°C	20	A
		T_c=100°C	13	A
Drain current (Pulsed) (Note 1)	I_{DM}		60	A
Single pulsed avalanche energy (Note 2)	E_{AS}		720	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	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250uA, V_{DS}=V_{GS}	2.5	3.5	4.5	V
Drain-source cut-off current	I_{DSS}	V_{DS}=600V, V_{GS}=0V	-	-	1	uA
		V_{DS}=480V, T_J=125°C	-	-	10	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	-	0.12	0.15	Ω
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	2893	-	pF
Output capacitance	C_{oss}		-	2181	-	
Reverse transfer capacitance	C_{rss}		-	48	-	
Turn-on delay time (Note 3)	$t_{d(on)}$	V_{DS}=400V, 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}=480V, V_{GS}=10V, I_D=20A	-	50	-	nC
Gate-source charge (Note 4)	Q_{gs}		-	13	-	
Gate-drain charge (Note 4)	Q_{gd}		-	17	-	

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}		-	-	60	A
Forward voltage	V_{SD}	V_{GS}=0V, I_S=20A	-	-	1.5	V
Reverse recovery time (Note 3,4)	t_{rr}	I_S=20A, V_{GS}=0V, dI_S/dt=100A/us	-	425	-	ns
Reverse recovery charge (Note 3,4)	Q_{rr}		-	6.8	-	uC

Note:
1. Calculated continuous current based on maximum allowable junction temperature
2. L=10mH, I_{AS}=12A, 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

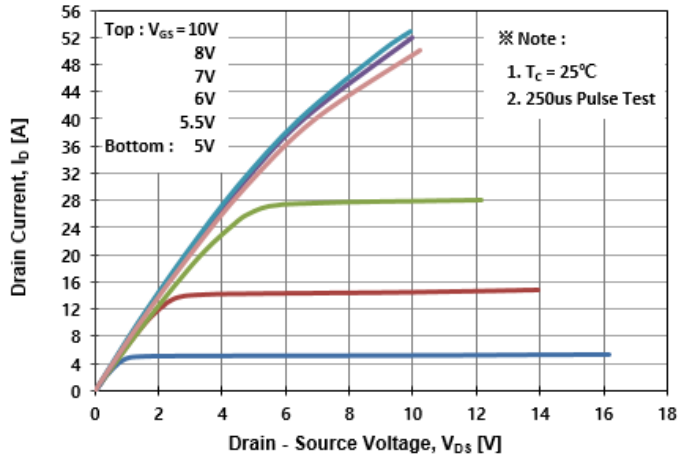


Fig. 2 Typical Output Characteristics

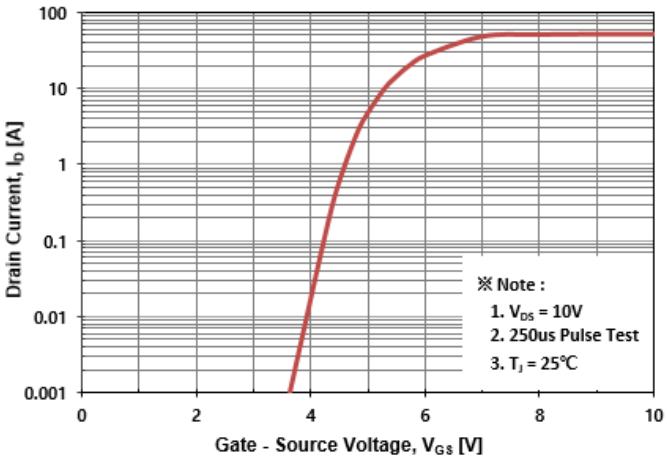


Fig.3 On-Resistance Variation with Gate Voltage

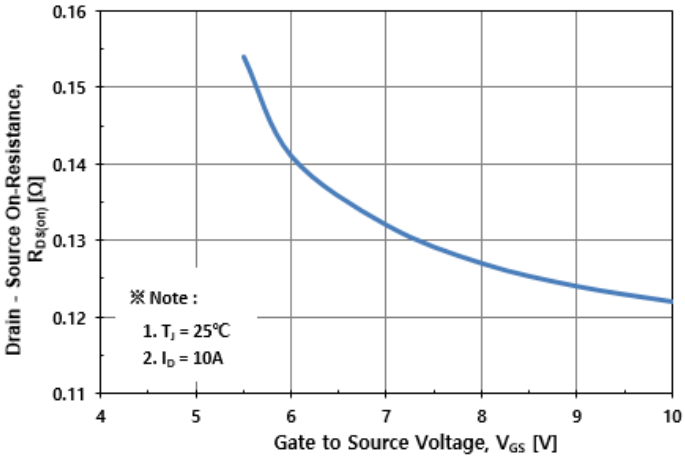


Fig. 4 Body Diode Forward Voltage Variation with Source Current

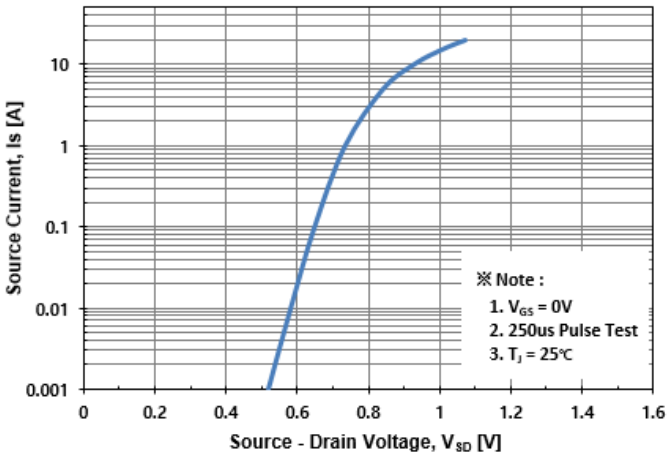


Fig. 5 Typical Capacitance Characteristics

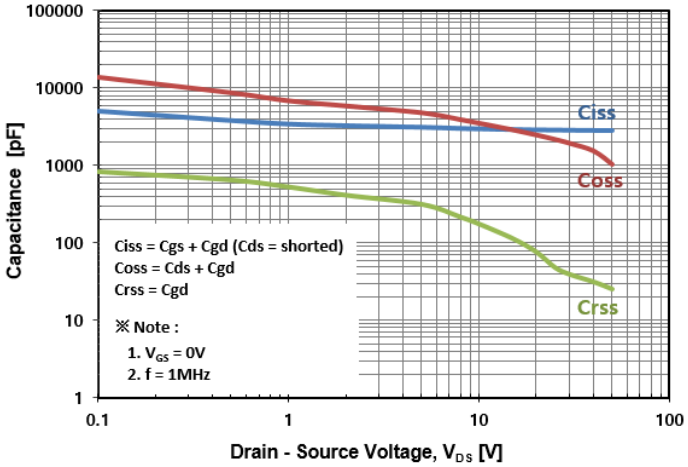


Fig. 6 Typical Total Gate Charge Characteristics

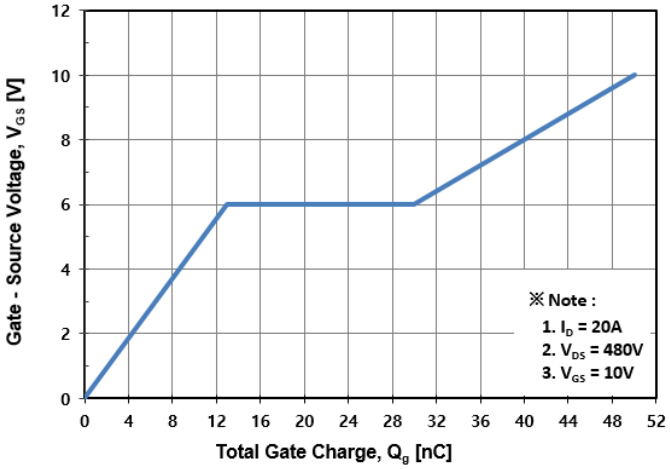


Fig. 7 Breakdown Voltage Variation vs. Temperature

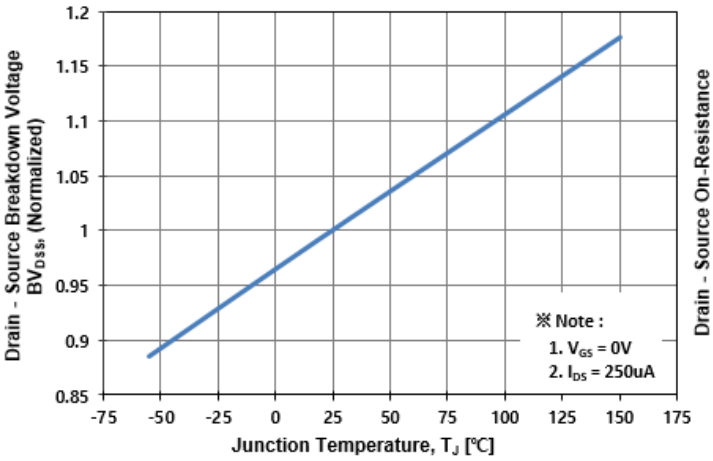


Fig. 8 On-Resistance Variation vs. Temperature

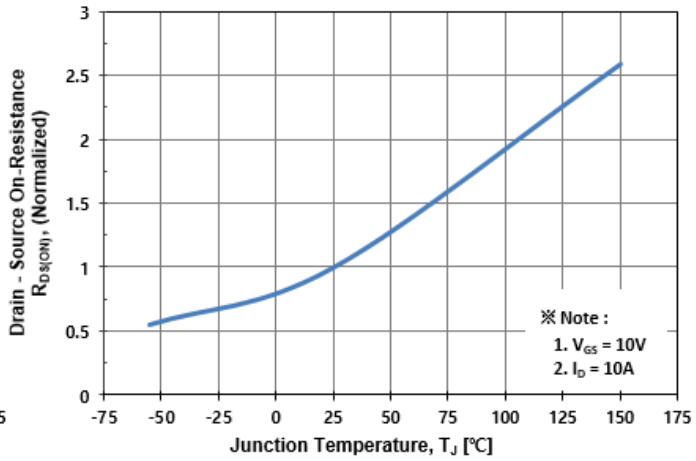


Fig. 9 Maximum Drain Current vs. Case Temperature

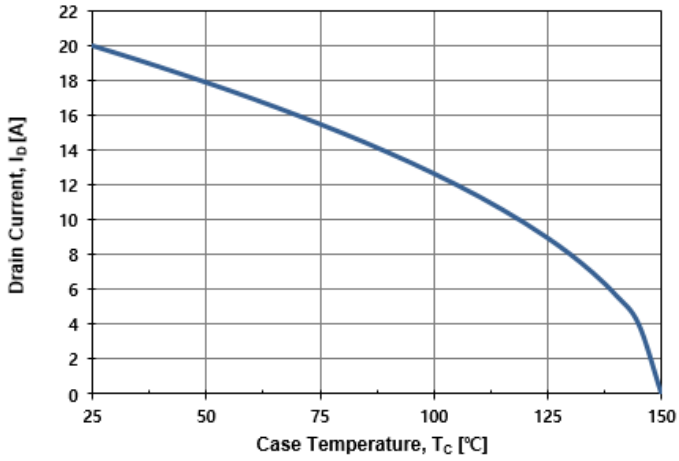


Fig. 10 Maximum Safe Operating Area

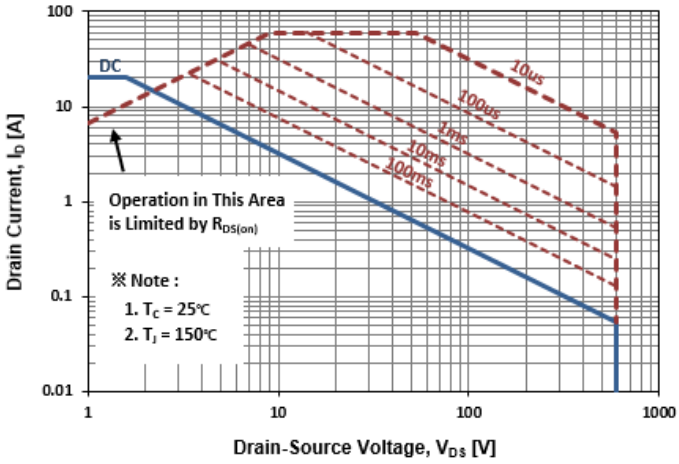


Fig. 11 Transient Thermal Impedance

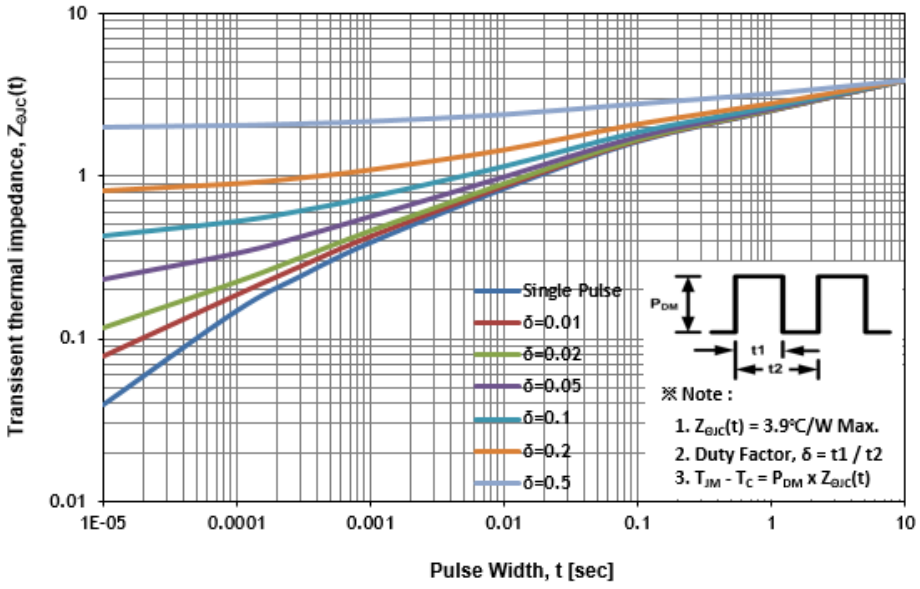


Fig. 12 Gate Charge Test Circuit & Waveform

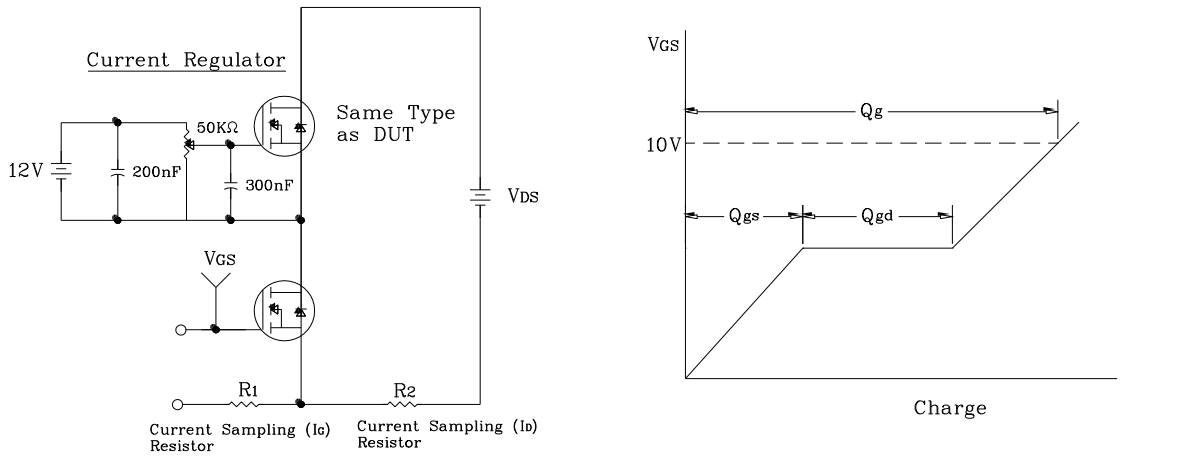


Fig. 13 Resistive Switching Test Circuit & Waveform

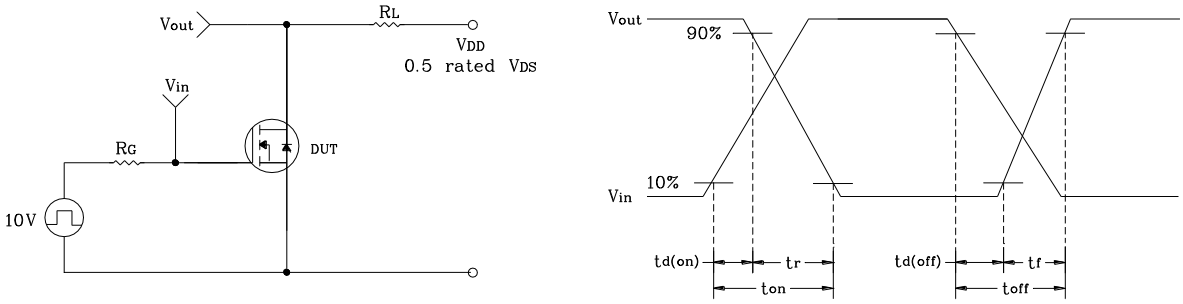


Fig. 14 E_{AS} Test Circuit & Waveform

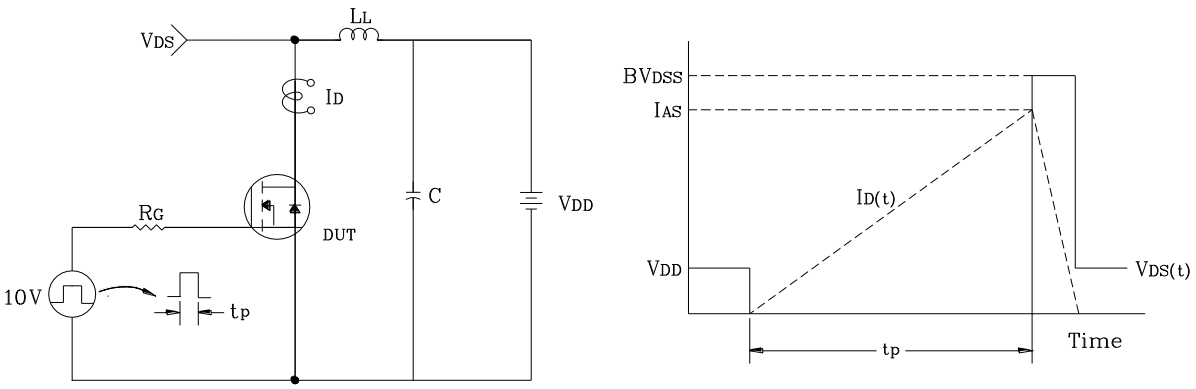
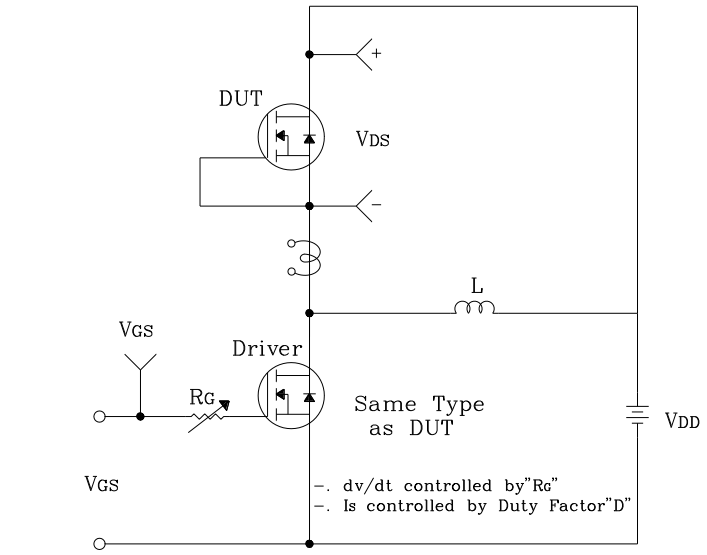
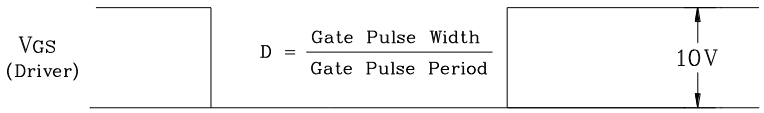
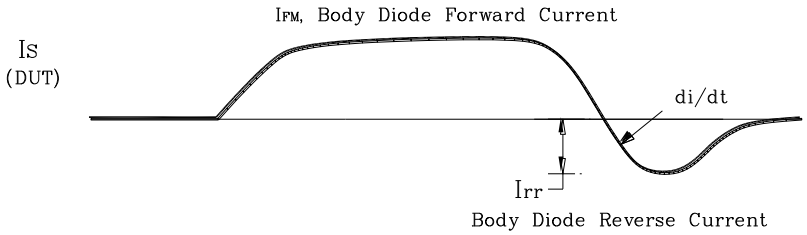
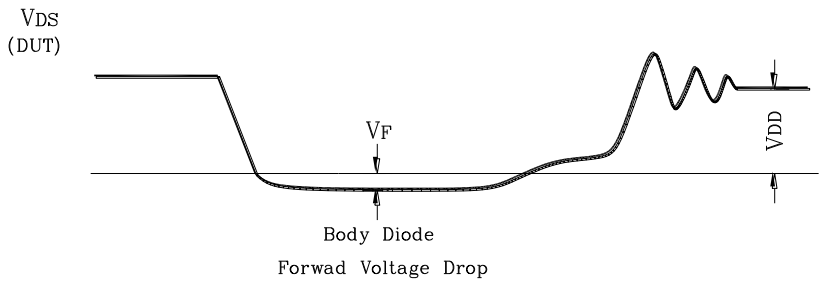


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

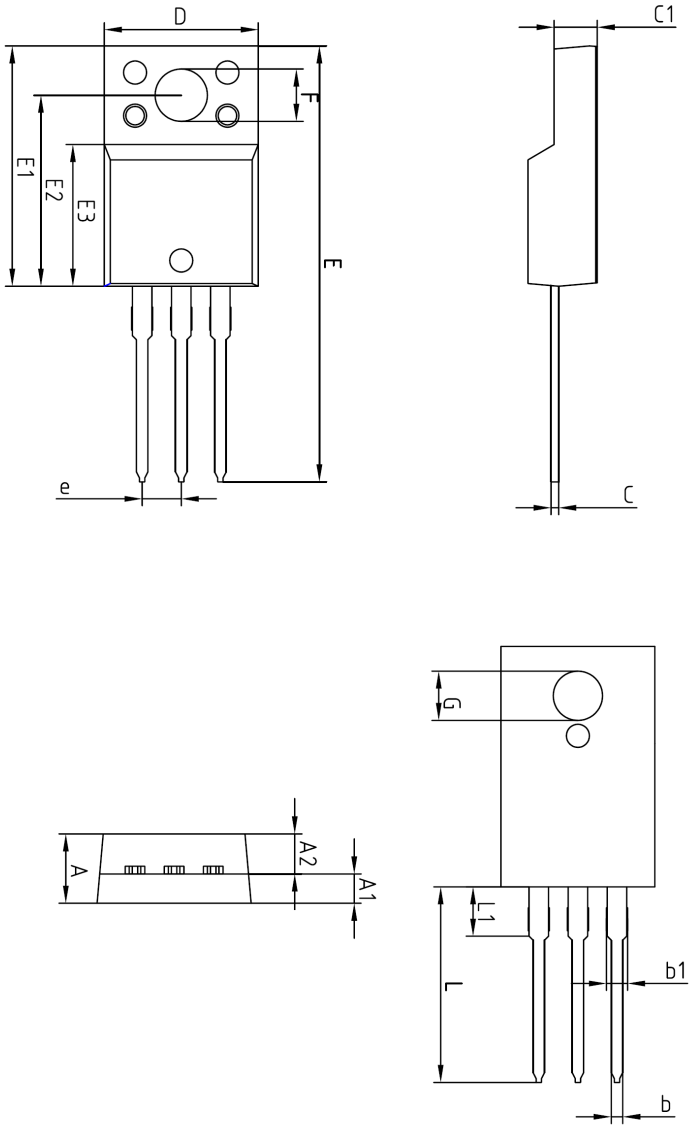








Package Outline Dimensions



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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