KODENSHI AUK

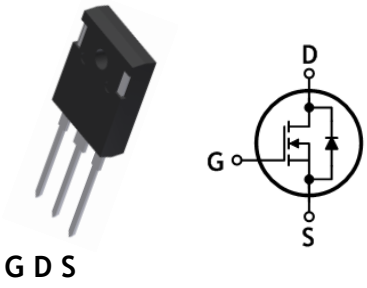
SJMN078R60W

N-Channel Super-junction MOSFET

SWITCHING REGULATOR APPLICATION

Features

- 600V Super-junction MOSFET
- Low FOM $R_{DS(on)}$ * Q_g
- Low drain-source On-resistance: $R_{DS(on)}$=78mΩ (Max.)
- 100% avalanche tested
- RoHS compliant device



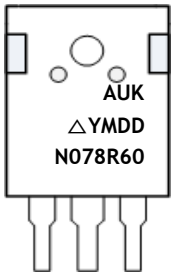
G D S

TO-247

Ordering Information

Part Number	Marking	Package
SJMN078R60W	N078R60	TO-247

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) *	I_D	T_c=25°C	48	A
		T_c=100°C	30.4	A
Drain current (Pulsed) *	I_{DM}		144	A
Single pulsed avalanche energy (Note 2)	E_{AS}		1508	mJ
Repetitive avalanche current (Note 1)	I_{AR}		9.6	A
Repetitive avalanche energy (Note 1)	E_{AR}		41.7	mJ
Power dissipation	P_D		417	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. 0.3	°C/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	Max. 40	

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}=0V	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250uA, V_{DS}=V_{GS}	2.5	-	4.5	V
Drain-source cut-off current	I_{DSS}	V_{DS}=600V, V_{GS}=0V	-	-	1	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=24A	-	66	78	mΩ
Forward transfer conductance (Note 4)	g_{fs}	V_{DS}=30V, I_D=24A	-	45	-	S
Input capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	5631	-	pF
Output capacitance	C_{oss}		-	3945	-	
Reverse transfer capacitance	C_{rss}		-	44	-	
Turn-on delay time (Note 4,5)	$t_{d(on)}$	V_{DD}=300V, I_D=48A, R_G=25Ω, V_{GS}=10V	-	82	-	ns
Rise time (Note 4,5)	t_r		-	186	-	
Turn-off delay time (Note 4,5)	$t_{d(off)}$		-	352	-	
Fall time (Note 4,5)	t_f		-	111	-	
Total gate charge (Note 4,5)	Q_g	V_{DS}=480V, V_{GS}=10V, I_D=48A	-	140		nC
Gate-source charge (Note 4,5)	Q_{gs}		-	38	-	
Gate-drain charge (Note 4,5)	Q_{gd}		-	46	-	

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	-	-	48	A
Source current (Pulsed)	I_{SM}		-	-	144	A
Forward voltage	V_{SD}	V_{GS}=0V, I_S=48A	-	-	1.25	V
Reverse recovery time (Note 4,5)	t_{rr}	I_S=48A, V_{GS}=0V, dI_S/dt=100A/us	-	680	-	ns
Reverse recovery charge (Note 4,5)	Q_{rr}		-	12	-	uC

Note:
1. Repeated rating: Pulse width limited by safe operating area
2. I_{AS}=9.6A, V_{DD}=50V, R_G=25Ω, starting T_J=25°C, not subject to production test – verified by design/characterization
3. Pulse test: Pulse width≤300us, Duty cycle≤2%
4. Essentially independent of operating temperature typical characteristics

Typical Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

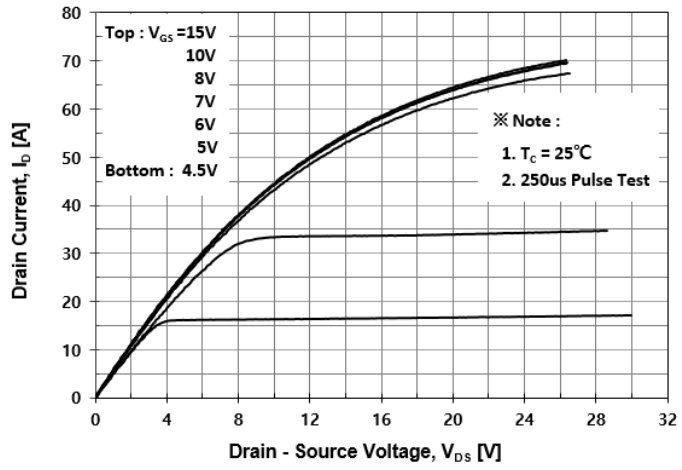


Fig. 2 Typical Transfer Characteristics

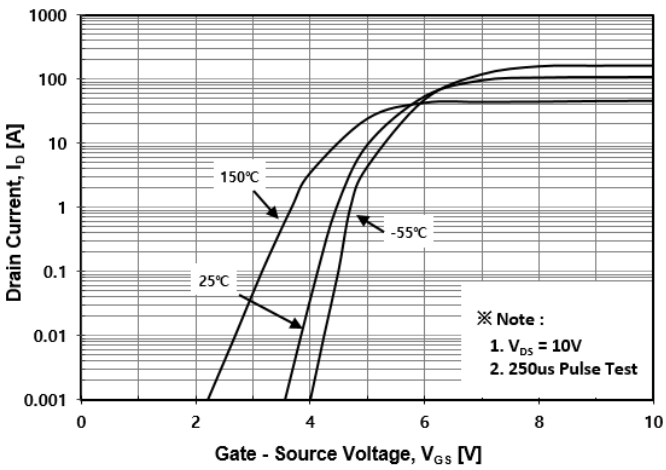


Fig.3 On-Resistance Variation with Drain Current and Gate Voltage

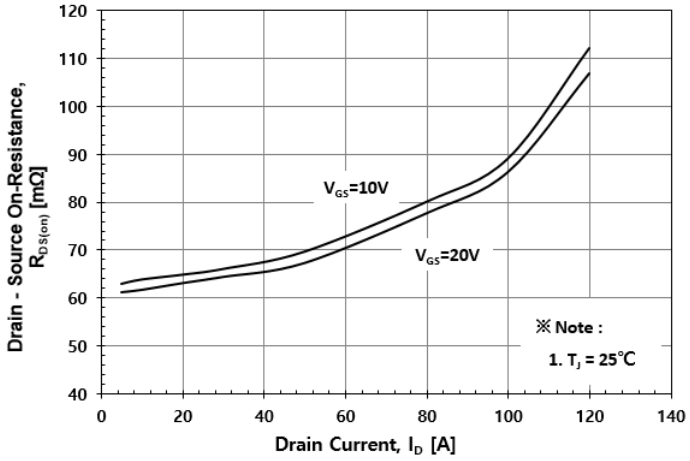


Fig. 4 Body Diode Forward Voltage Variation with Source Current

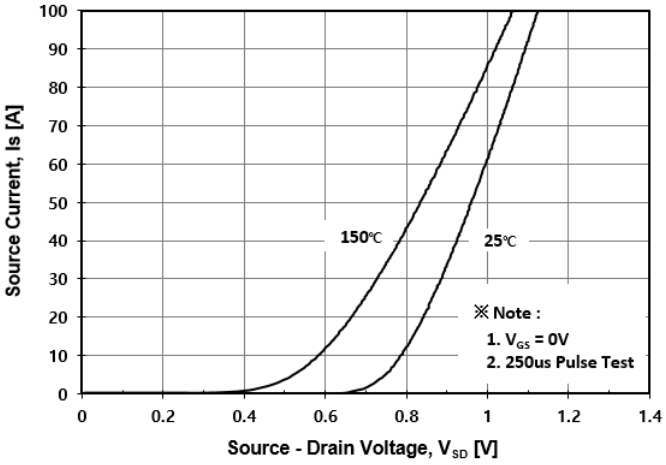


Fig. 5 Typical Capacitance Characteristics

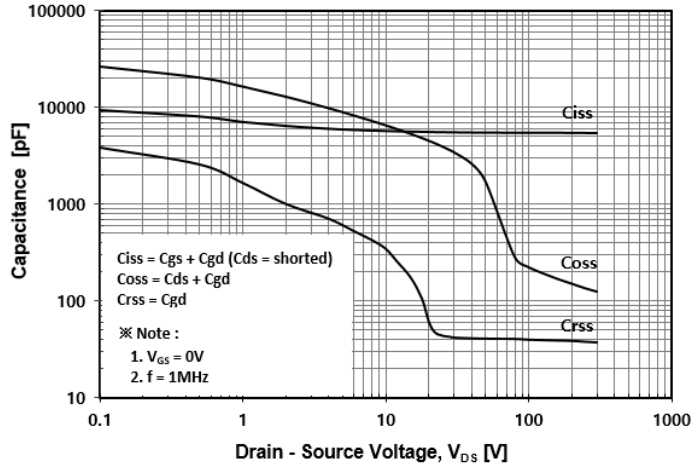


Fig. 6 Typical Total Gate Charge Characteristics

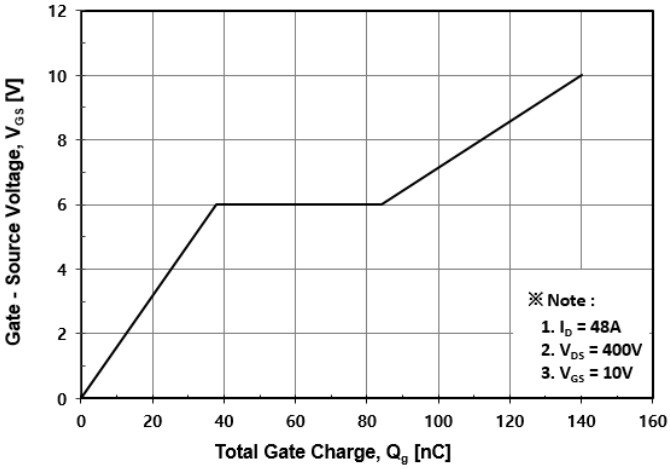


Fig. 7 Breakdown Voltage Variation vs. Temperature

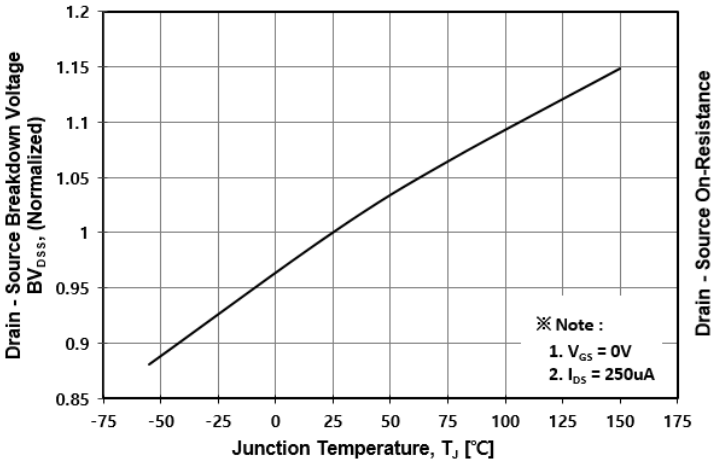


Fig. 8 On-Resistance Variation vs. Temperature

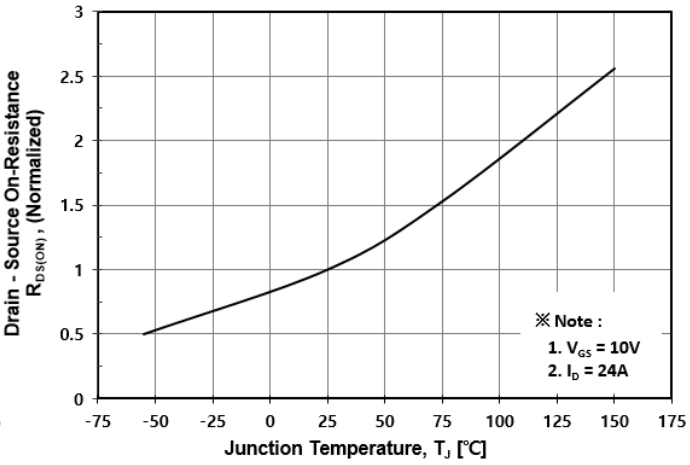


Fig. 9 Maximum Drain Current vs. Case Temperature

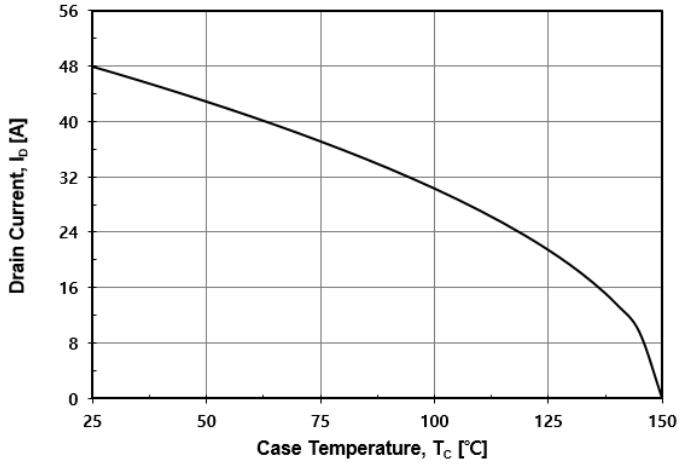


Fig. 10 Maximum Safe Operating Area

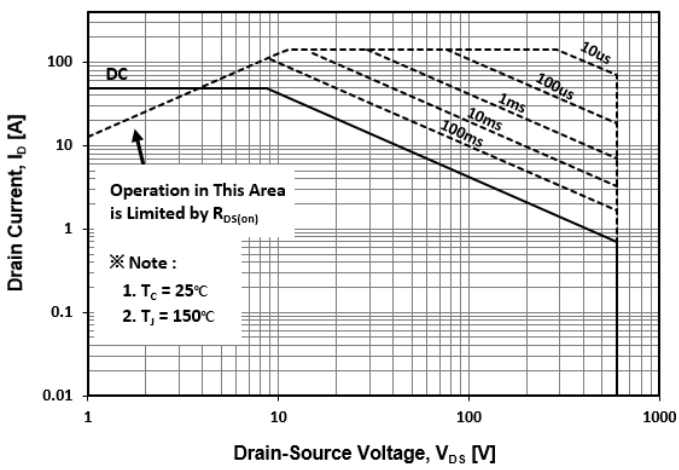


Fig. 11 Transient Thermal Impedance

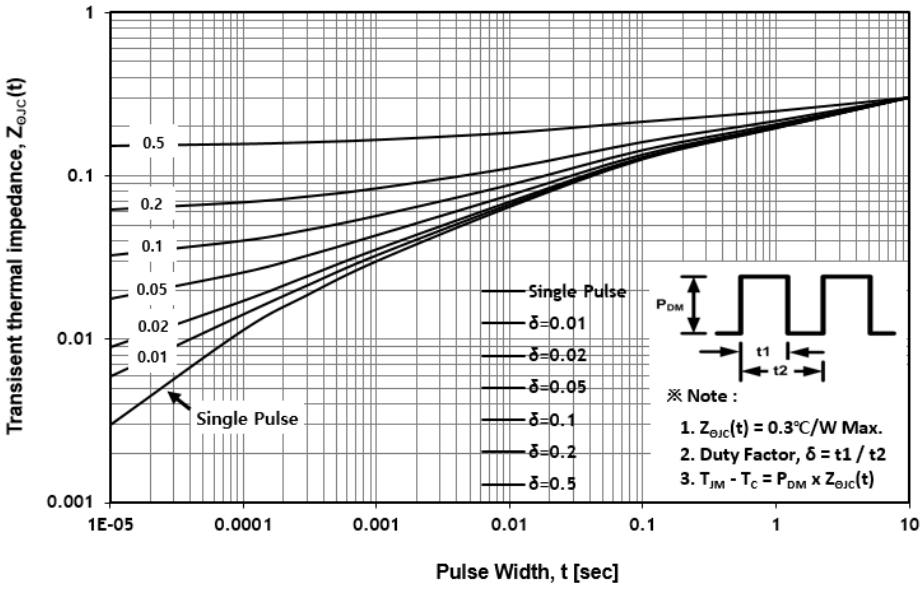
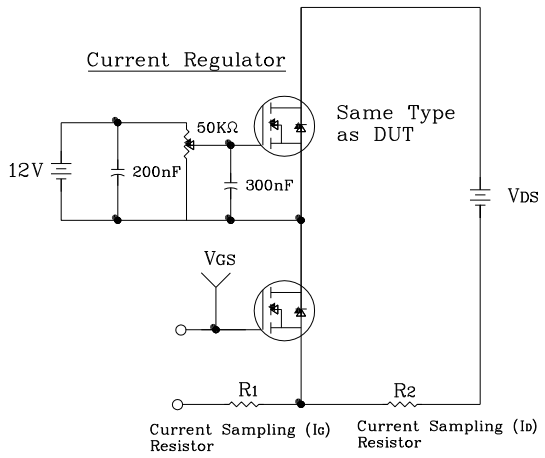


Fig. 12 Gate Charge Test Circuit & Waveform



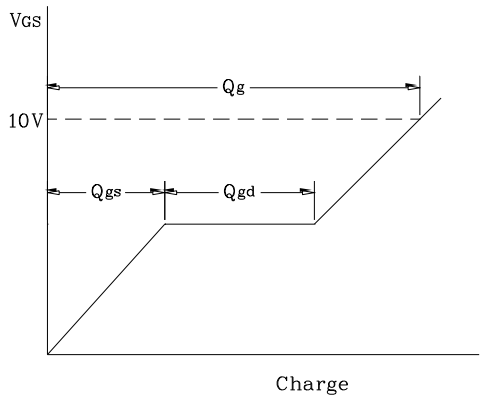
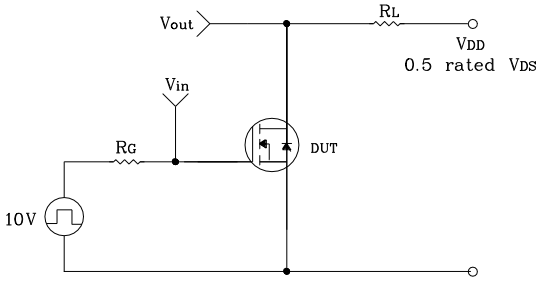


Fig. 13 Resistive Switching Test Circuit & Waveform



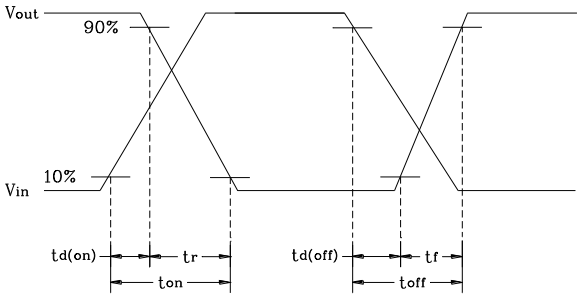
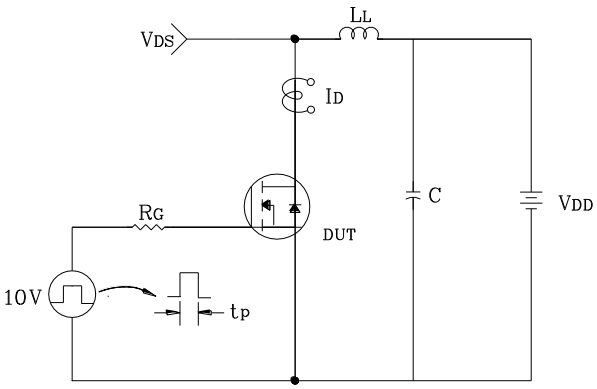


Fig. 14 E_{AS} Test Circuit & Waveform



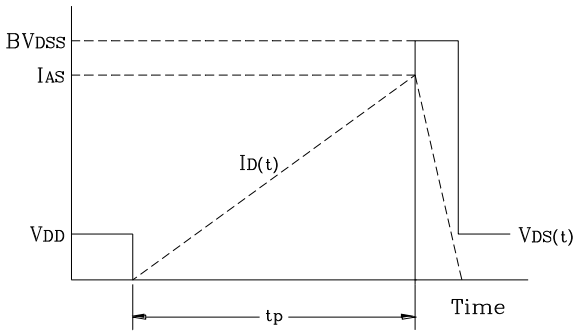
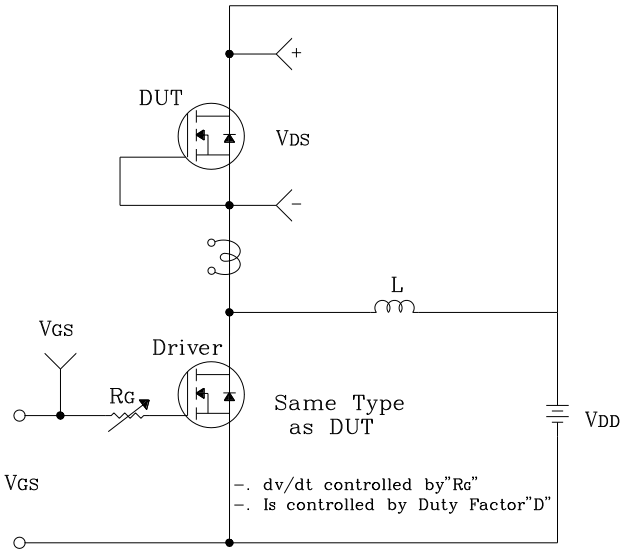
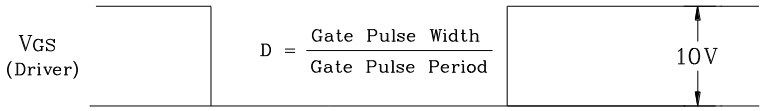
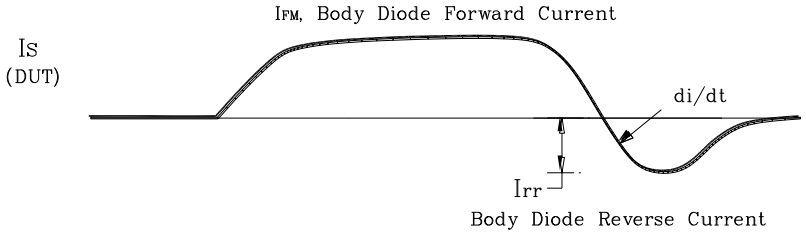
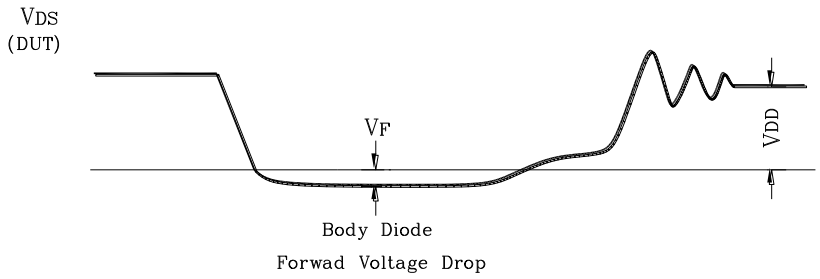


Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform

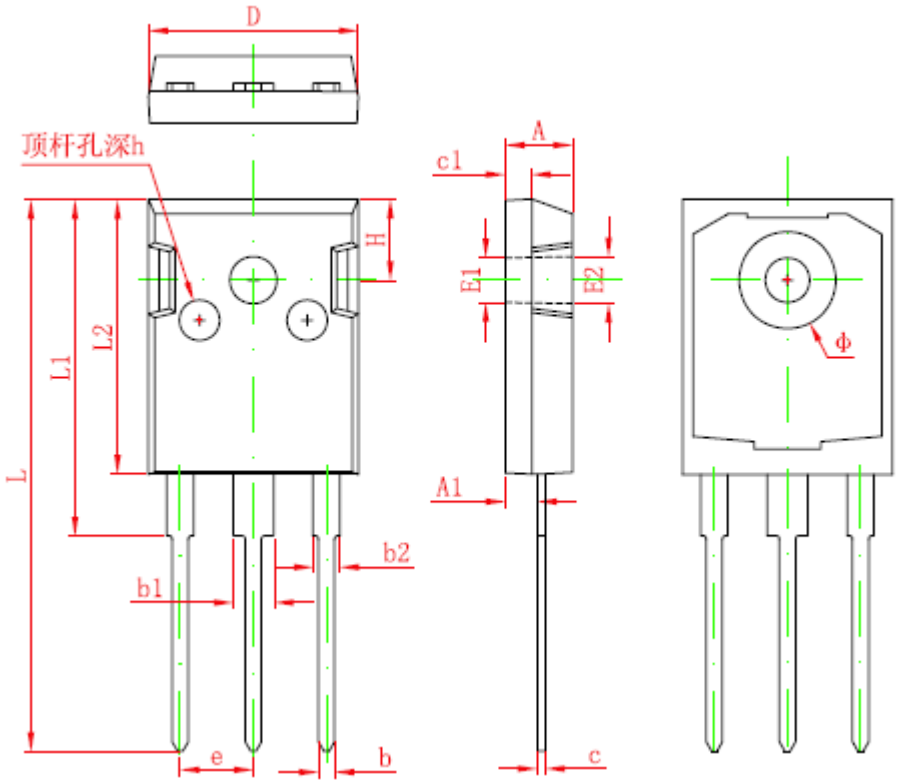








Package Outline Dimensions (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	
h	0.000	0.300	0.000	0.012

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