

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



ESD



TVS



MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

▶ Domestic	Part Number	IRFZ48NS
▶ Overseas	Part Number	IRFZ48NS
▶ Equivalent	Part Number	IRFZ48NSTRL

EV is the abbreviation of name EVVO

## 60V N-Channel Enhancement Mode MOSFET

### Description

The IRFZ48NS uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

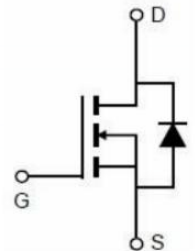
### Application

- Battery protection
- Load switch
- Uninterruptible power supply

### General Features

- $V_{DS} = 60V$   $I_D = 50A$
- $R_{DS(ON)} < 12m\Omega$  @  $V_{GS} = 10V$
- $R_{DS(ON)} < 15m\Omega$  @  $V_{GS} = 4.5V$

### TO-263 Pin Configuration



### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	50	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	25	A
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	7.4	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	6	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	90	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	39.2	mJ
$I_{AS}$	Avalanche Current	28	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>4</sup>	45	W
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>4</sup>	2	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	62	$^\circ C/W$

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R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	2.8	°C/W
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### Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	60	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.057	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	10	13	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	---	12	15	
V <sub>GS(th)</sub>	Gate Threshold Voltage		1.2	---	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	---	-5.68	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =15A	---	45	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	1.7	---	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =48V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	---	19.3	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	7.1	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	7.6	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3, I <sub>D</sub> =15A	---	7.2	---	ns
T <sub>r</sub>	Rise Time		---	50	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	36.4	---	
T <sub>f</sub>	Fall Time		---	7.6	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	---	2423	---	pF
C <sub>oss</sub>	Output Capacitance		---	145	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	97	---	
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>GS</sub> =V <sub>D</sub> =0V, Force Current	---	---	35	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	80	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =A, T <sub>J</sub> =25°C	---	---	1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =15A, di/dt=100A/μs, T <sub>J</sub> =25°C	---	16.3	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	11	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is VDD=25V,VGS=10V,L=0.1mH,IAS=28A
- 4.The power dissipation is limited by 150°C junction temperature 5.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation

Typical Characteristics

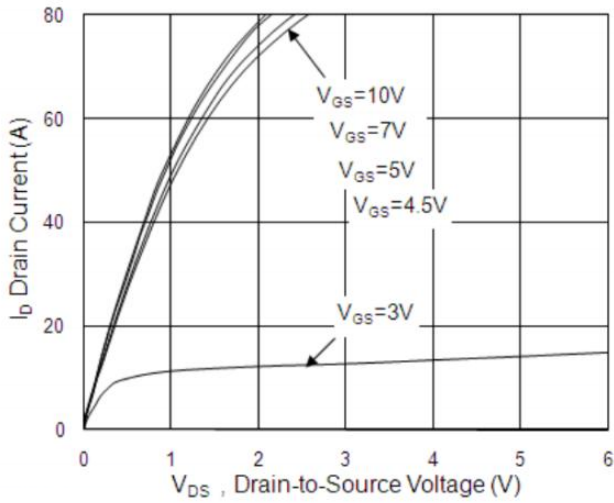


Fig.1 Typical Output Characteristics

60V N-Channel Enhancement Mode MOSFET

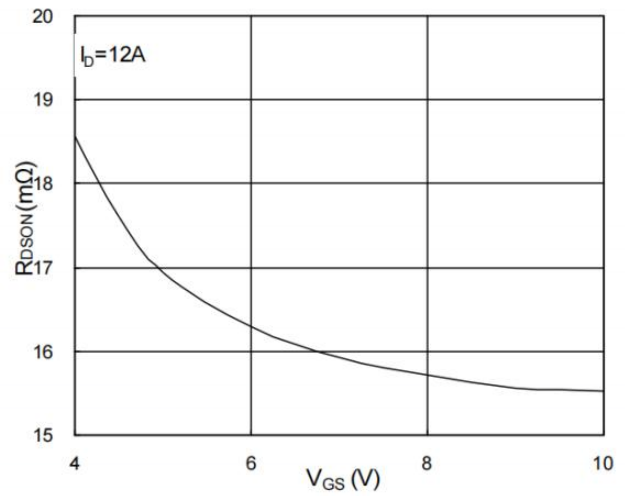


Fig.2 On-Resistance v.s Gate-Source

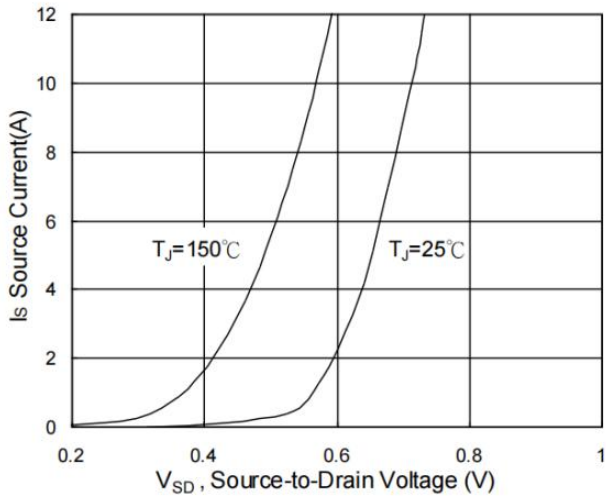


Fig.3 Forward Characteristics of Reverse

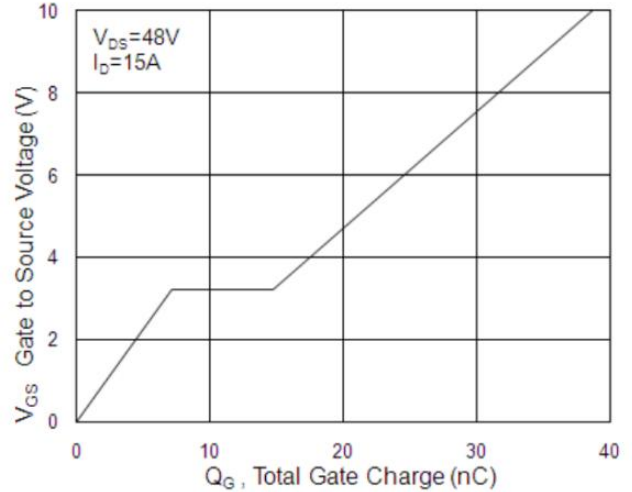


Fig.4 Gate-Charge Characteristics

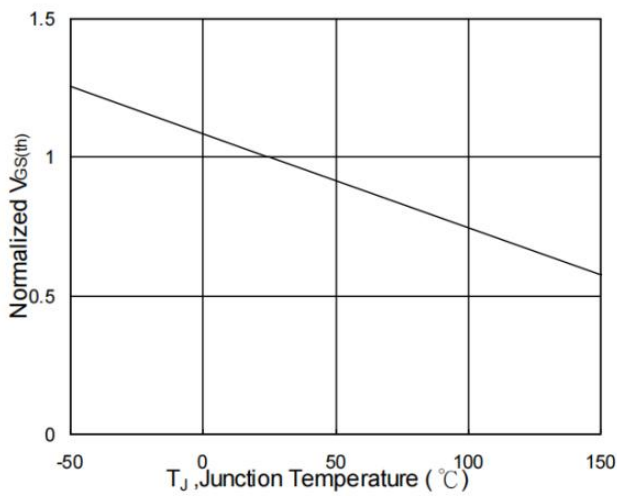


Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$

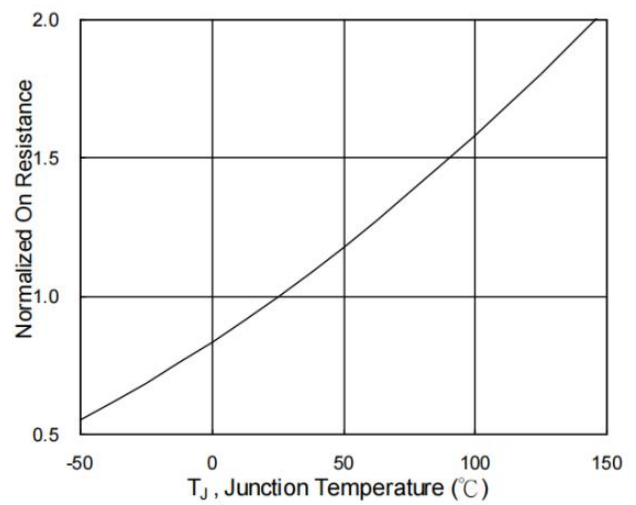


Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$

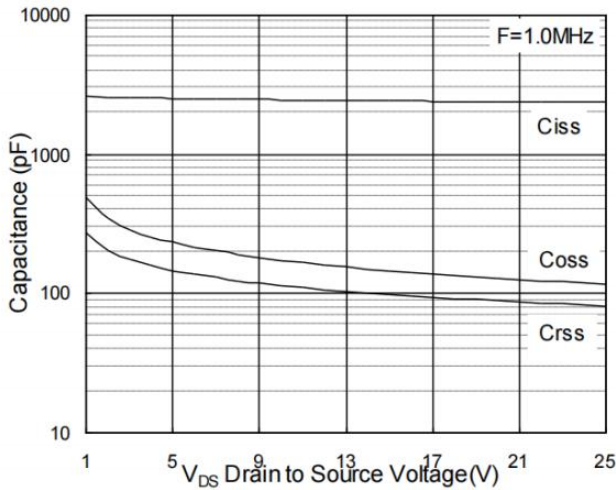


Fig.7 Capacitance

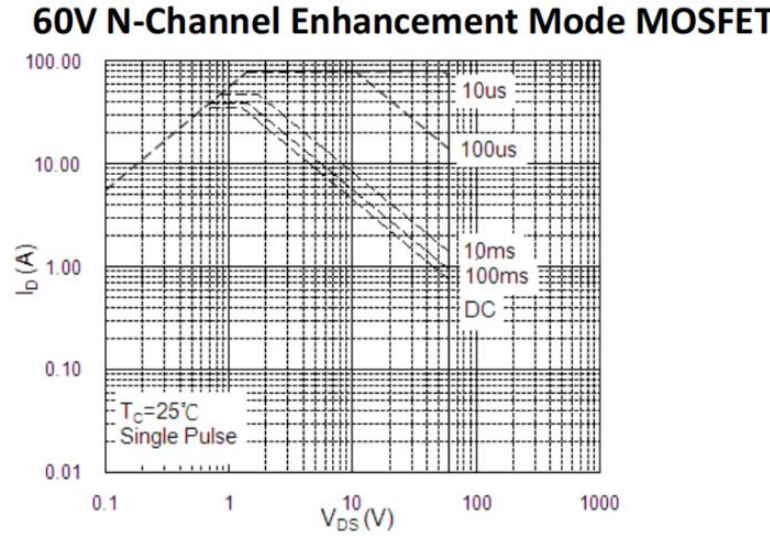


Fig.8 Safe Operating Area

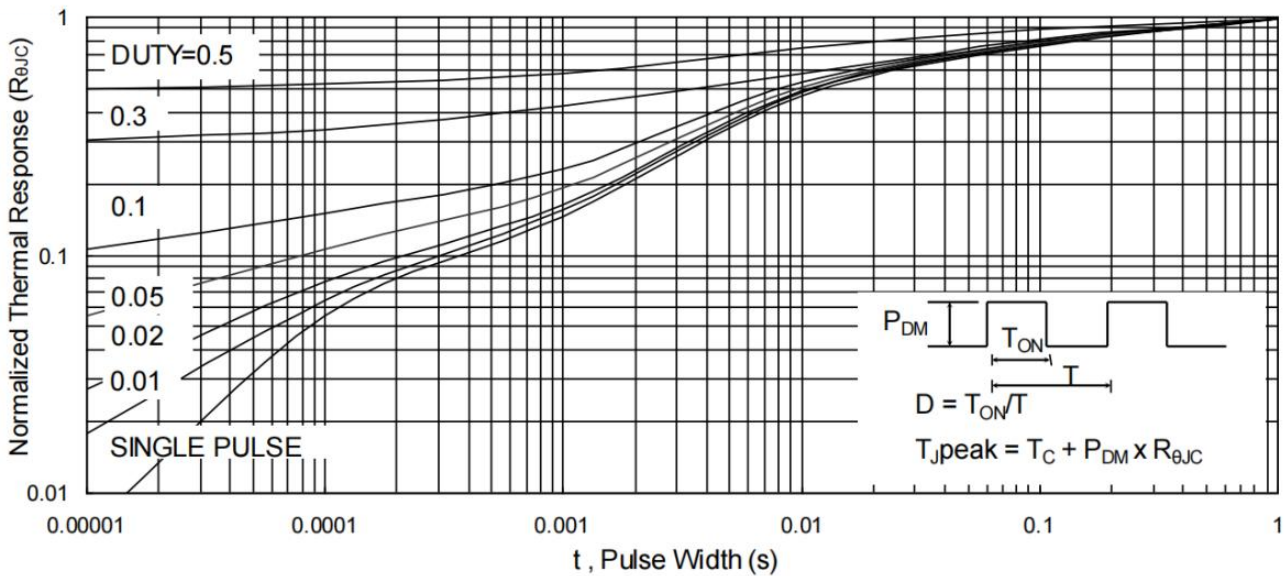


Fig.9 Normalized Maximum Transient Thermal Impedance

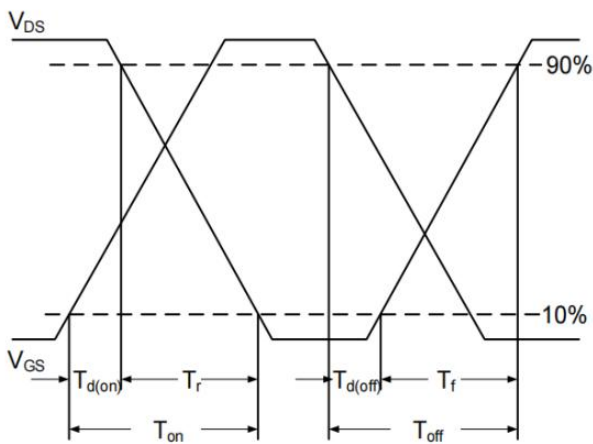


Fig.10 Switching Time Waveform

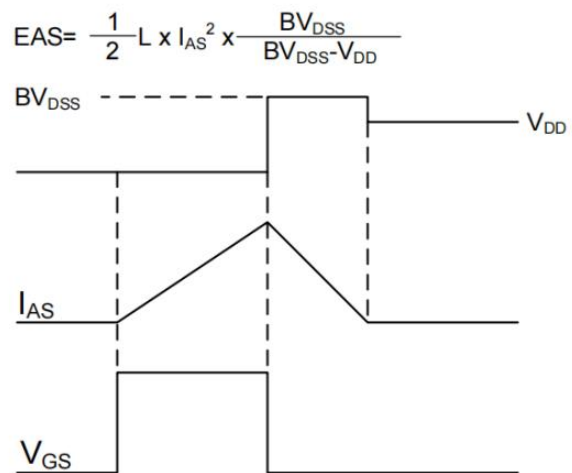
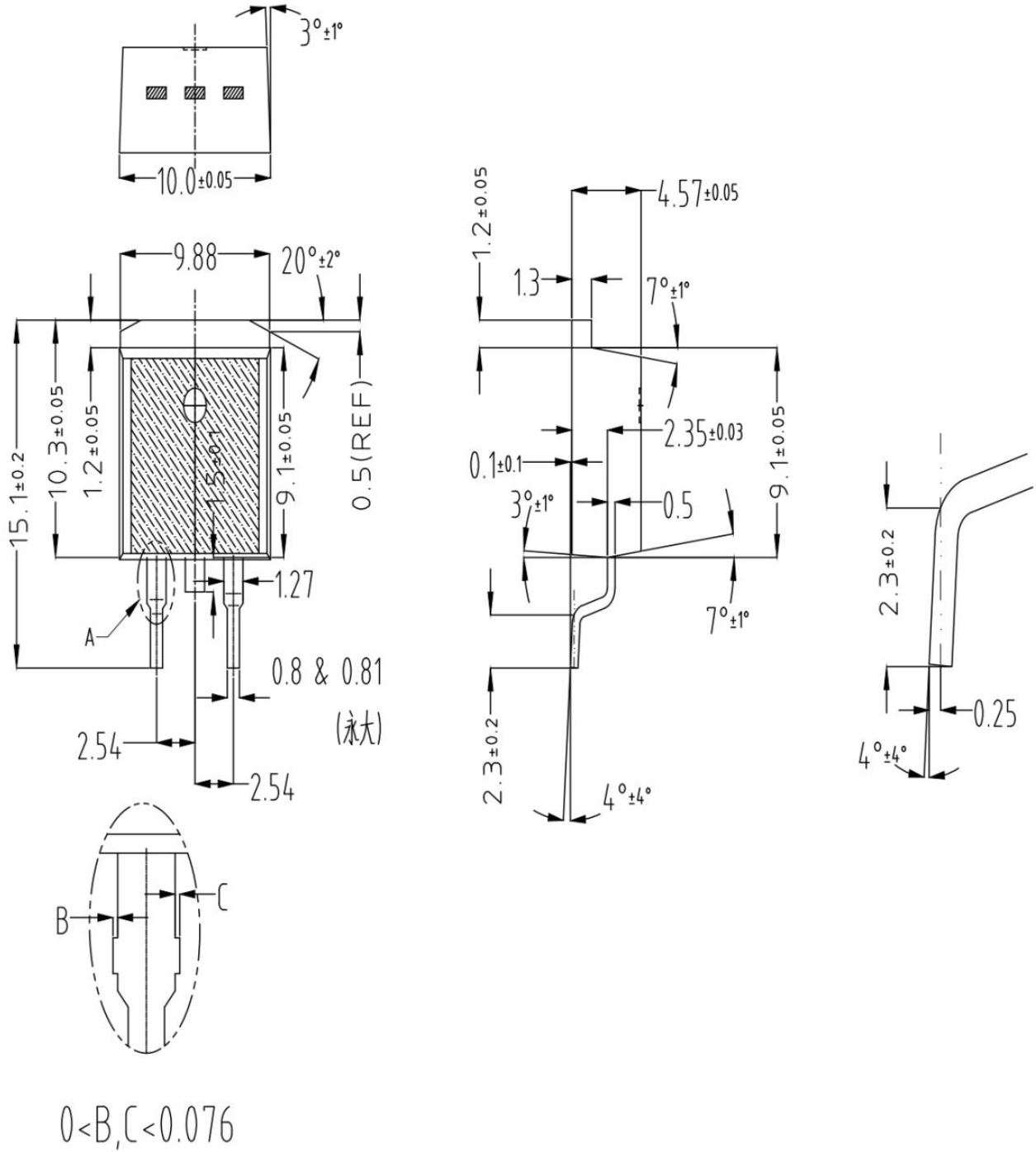


Fig.11 Unclamped Inductive Switching Waveform

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TO-263 Package Outline Dimensions

Package Outline Dimensions (Units: mm)



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