

## 4.8A 650V N-channel Super Junction Power MOSFET

### 1 Description

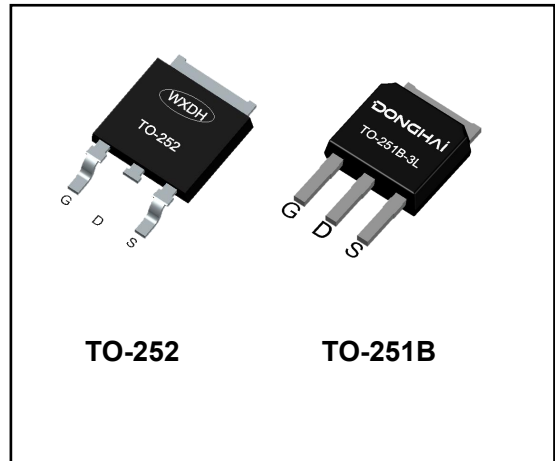
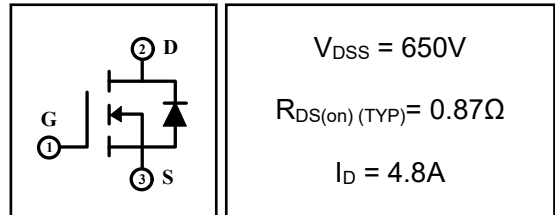
These N-channel enhanced VDMOSFETs, is using advanced super junction technology and design to provide excellent  $R_{DS(on)}$  with low gate charge. Which accords with the RoHS standard.

### 2 Features

- Fast switching
- Low on resistance
- Low gate charge
- Low reverse transfer capacitances
- 100% single pulse avalanche energy test
- 100%  $\Delta V_{DS}$  test

### 3 Applications

- Switched mode power supplies(SMPS).
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom



### 4 Electrical Characteristics

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

Parameter	Symbol	Value	Units
Drian-to-Source Voltage	$V_{DSS}$	650	V
Gate-to-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	4.8
		$T_C=100^\circ C$	3.0
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	14.4	A
Single Pulse Avalanche Energy <sup>(4)</sup>	$E_{AS}$	43	mJ
Repetitive Avalanche Current <sup>(4)</sup>	$I_{AR}$	1.0	A
Power Dissipation	$P_{tot}$	$T_a=25^\circ C$	2
		$T_C=25^\circ C$	50
Peak diode Reverse $dv/dt$ ( $I_{SD} \leq 2.5A, V_{DS} \leq 400V, T_j = 25^\circ C$ )	$dv/dt$	15	V/ns
Gate-Source ESD (HBM-C=100pF, R=1.5K $\Omega$ )	$V_{ESD(G-S)}$	2000	V
Junction Temperature Range	$T_j$	-55~150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ C$

#### 4.2 Thermal Characteristics

Parameter	Symbol	Typ	Unit
Thermal Resistance, Junction to Case-sink	$R_{thJC}$	2.7	$^\circ C/W$
Thermal Resistance, Junction to Ambient	$R_{thJA}$	62.5	$^\circ C/W$

**4.3 Electrical Characteristics** (T<sub>c</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Test Condition	Value			Units
			Min	Typ	Max	
<b>Off Characteristics</b>						
Drain-to-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	650	--	--	V
Drain-to-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C	--	--	1	μA
		V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>C</sub> =150°C	--	--	100	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V	--	--	±1000	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2	--	4	V
Drain-to-Source on-state Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =1.3A	--	0.87	1.0	Ω
Forward Transfer conductance	g <sub>fs</sub>	V <sub>DS</sub> =20V, I <sub>D</sub> =2.5A	--	5.2	--	S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =400V, f=1.0MHz	--	390	--	pF
Output Capacitance	C <sub>oss</sub>		--	13	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	2.1	--	
<b>Switching Characteristics</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> =1.8A, V <sub>DD</sub> =325V, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω	--	20	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	18	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	54	--	
Turn-off Fall Time	t <sub>f</sub>		--	19	--	
Total Gate Charge	Q <sub>g</sub>	I <sub>D</sub> =1.8A, V <sub>DD</sub> =520V, V <sub>GS</sub> =10V	--	9.3	--	nC
Gate-to-Source Charge	Q <sub>gs</sub>		--	1.8	--	
Gate-to-Drain("Miller") Charge	Q <sub>gd</sub>		--	3.0	--	
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(3)</sup>	V <sub>FSD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1.8A	--	--	1.2	V
Diode Forward Current	I <sub>S</sub>		--	--	4.8	A
Reverse Recovery Time <sup>(3)</sup>	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>F</sub> =1.8A, dI <sub>F</sub> /dt=100A/μS, V <sub>R</sub> =400V	--	210	--	ns
Reverse Recovery Charge <sup>(3)</sup>	Q <sub>rr</sub>		--	1200	--	nC

**Notes:**

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t<sub>s</sub>≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.
- 4: L=10mH, I<sub>D</sub>=2.95A, V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, R<sub>G</sub>=25Ω, V<sub>GATE</sub>=650V, Start T<sub>J</sub>=25°C.

## 5 Typical characteristics diagrams

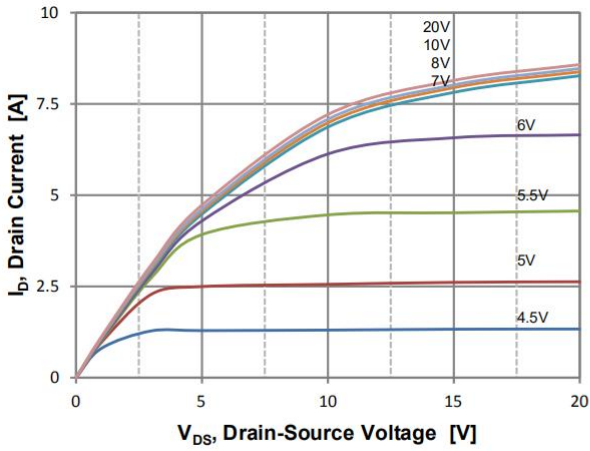


Figure 1. On Region Characteristics

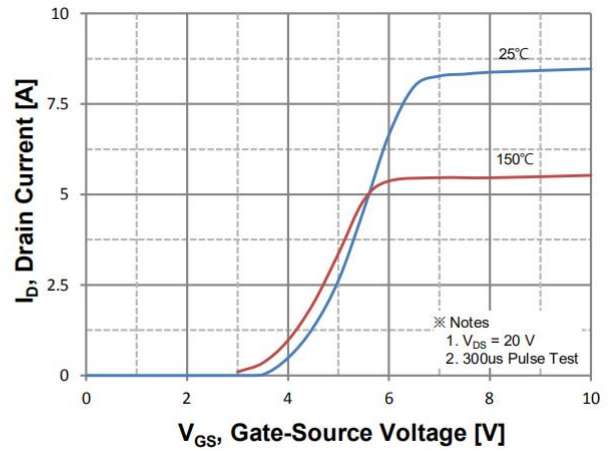


Figure 2. Transfer Characteristics

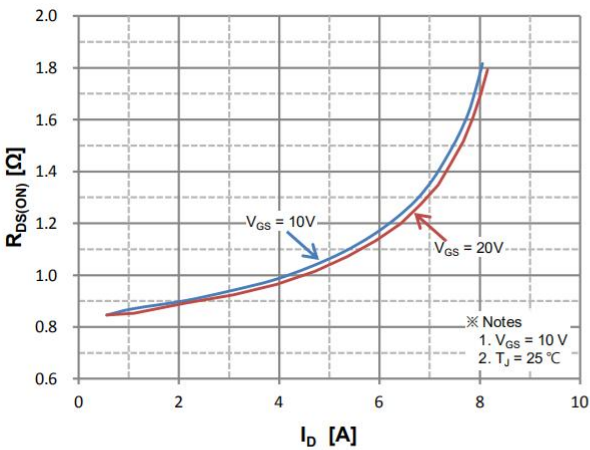


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

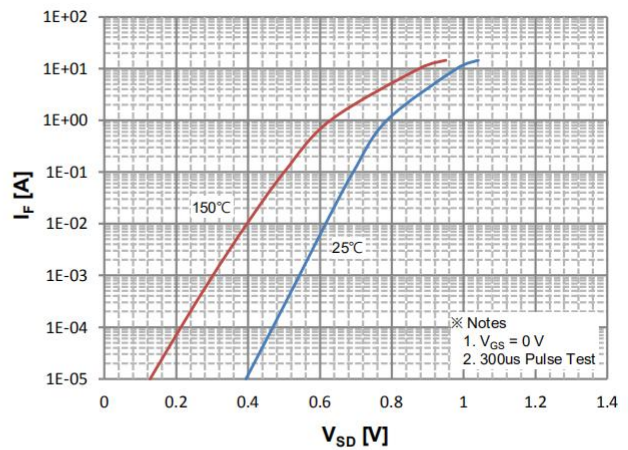


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

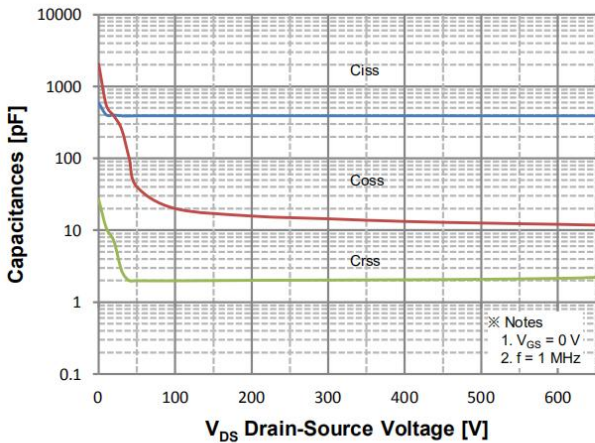


Figure 5. Capacitance Characteristics

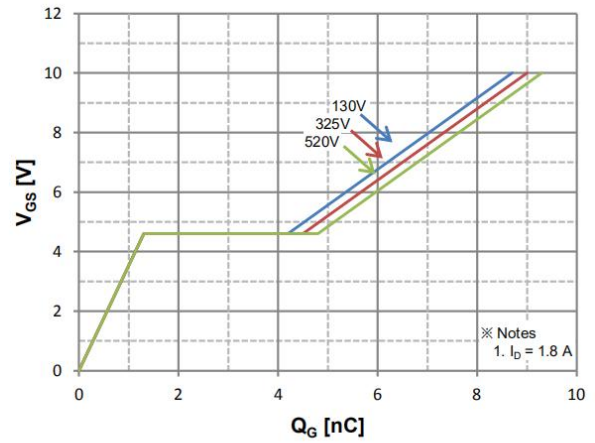
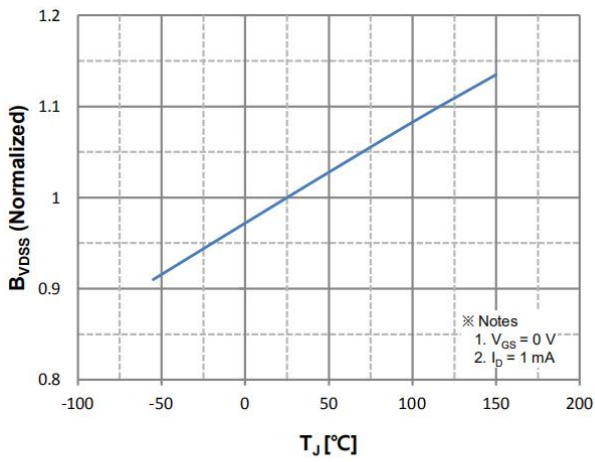
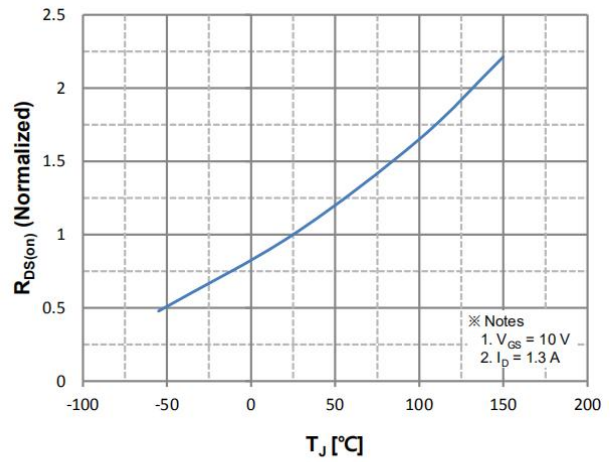


Figure 6. Gate Charge Characteristics

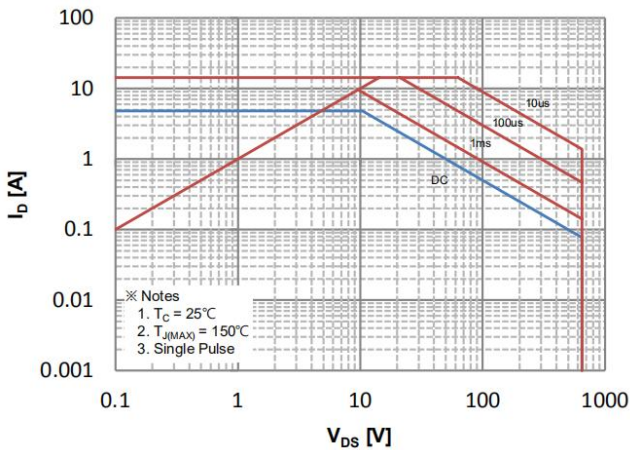
## 5 Typical characteristics diagrams(continues)



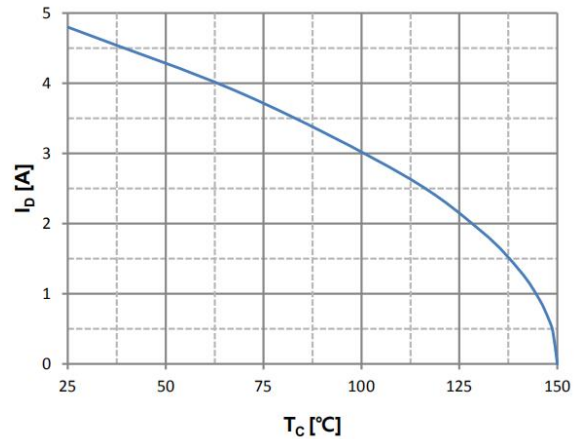
**Figure 7. Breakdown Voltage Variation vs. Temperature**



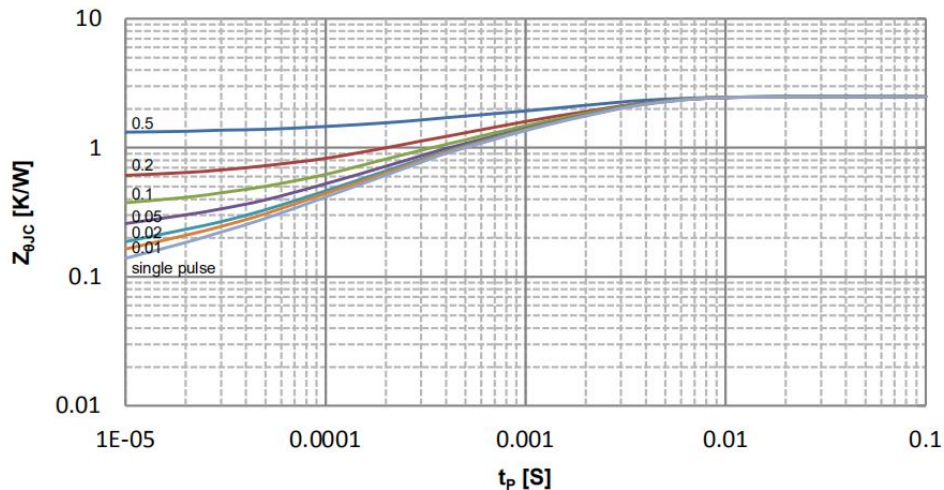
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**

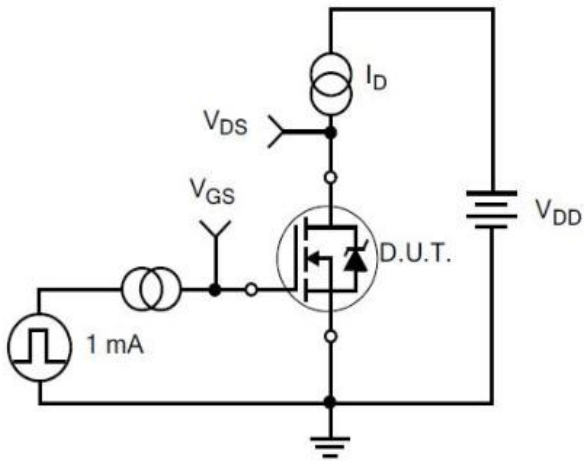


**Figure 10. Maximum Drain Current vs. Case Temperature**

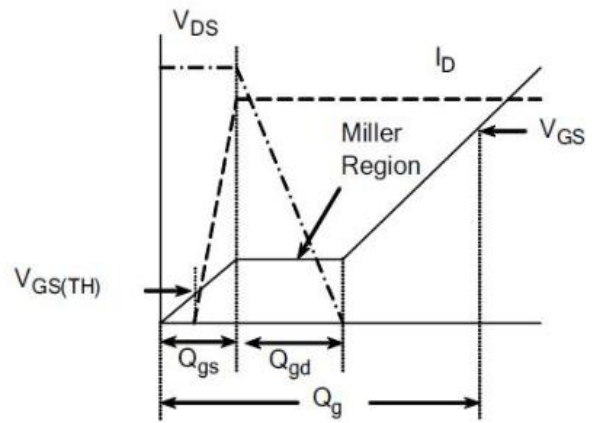


**Figure 11. Transient Thermal Response Curve**

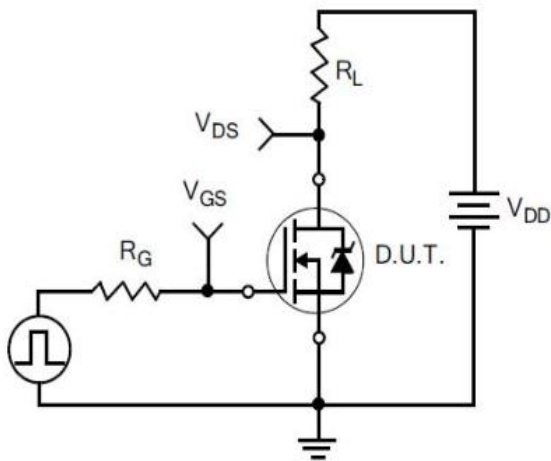
**6 Typical Test Circuit and Waveform**



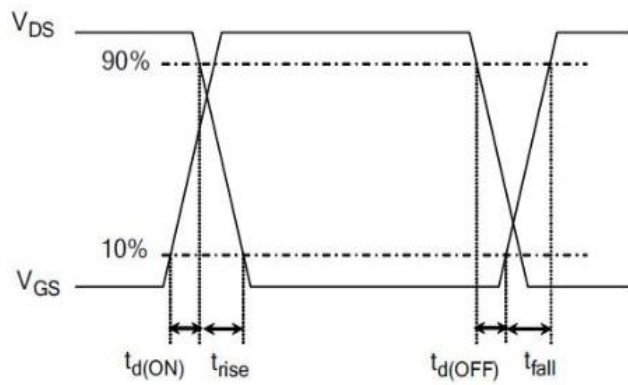
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

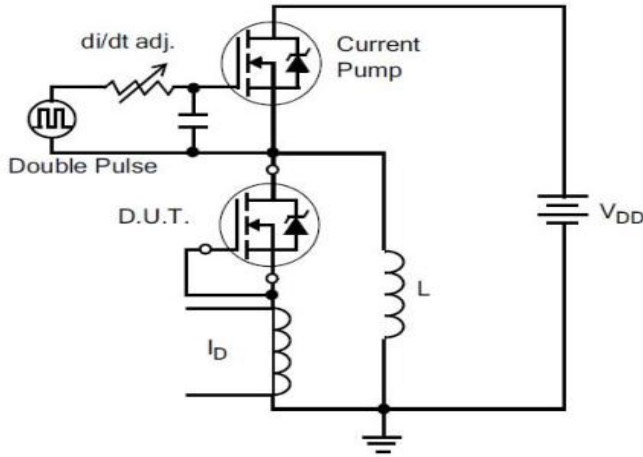


3) Resistive Switching Test Circuit

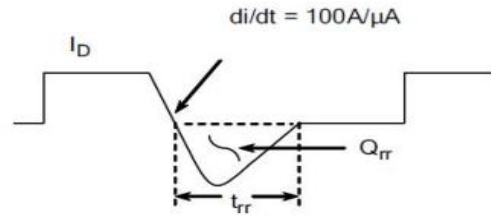


4) Resistive Switching Waveforms

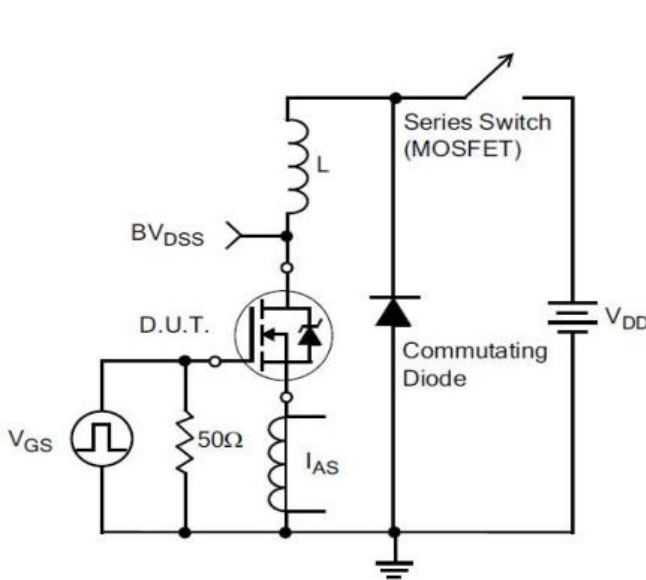
6 Typical Test Circuit and Waveform(continues)



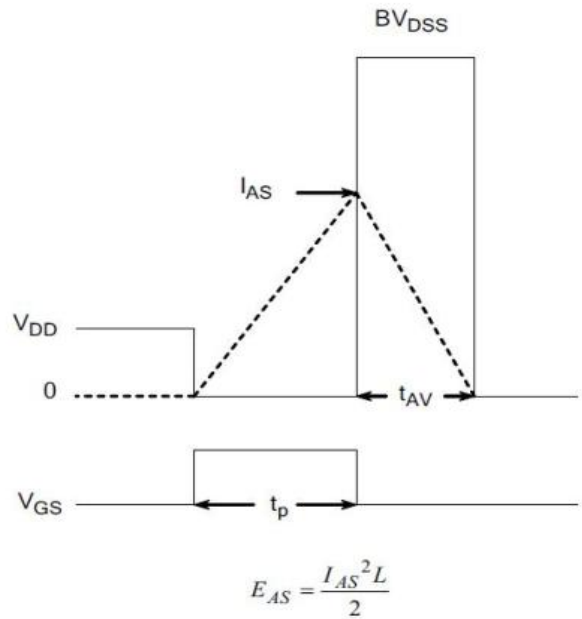
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



7) . Unclamped Inductive Switching Test Circuit



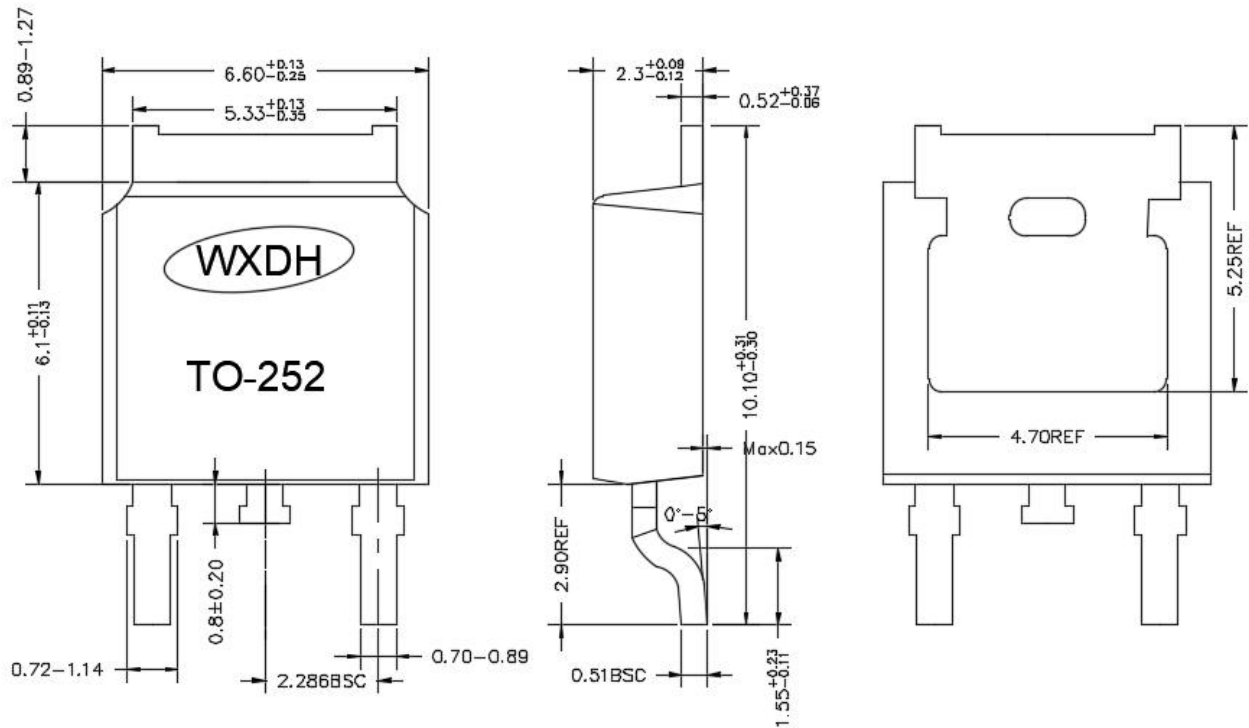
8) Unclamped Inductive Switching Waveforms

7 Product Specifications and Packaging Models

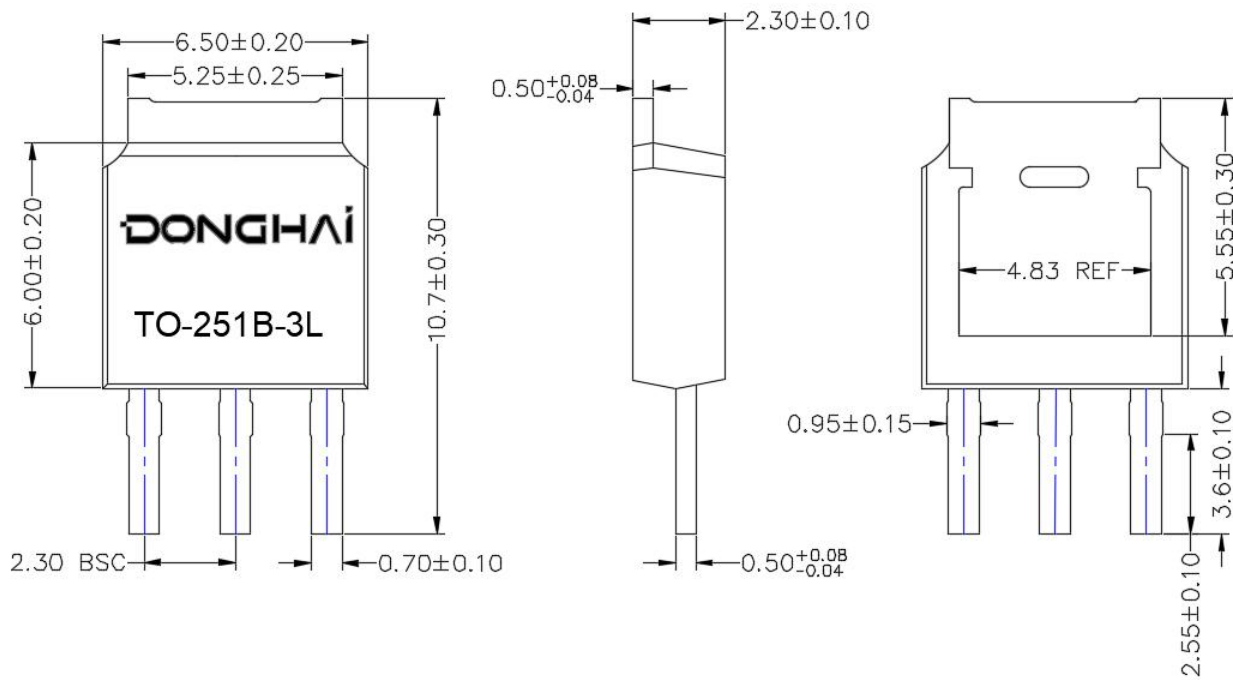
Product Model	Package Type	Mark Name	RoHS	Package	Quantity
DHDSJ5N65	TO-252	DHDSJ5N65	Pb-free	Tape & Reel	2500/box
DHBSJ5N65	TO-251B	DHBSJ5N65	Pb-free	Tube	3000/box

**8 Dimensions**

**TO-252 PACKAGE OUTLINE**



**TO-251B PACKAGE OUTLINE**



## 9 Attentions

- Jiangsu Donghai Semiconductor Technology CO.,LTD. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of Donghai products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

## 10 Appendix

Revision history:

Date	REV.	Description	Page
2020.06.14	1.0	Original	8