

## Description:

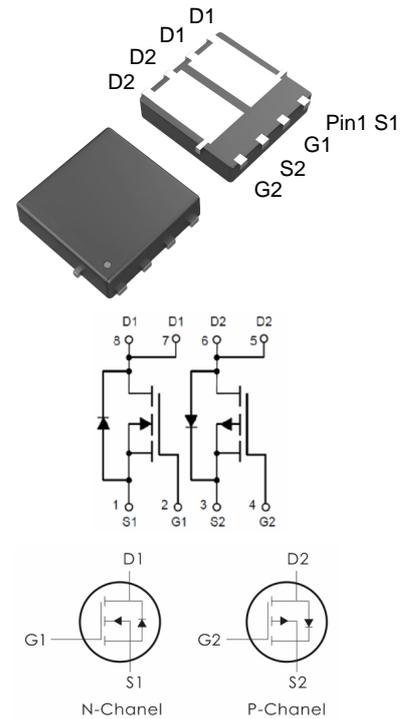
This MOSFET series features N Channel devices fabricated with advanced SGT technology and P Channel devices utilizing Trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

## Features:

N-Channel:  $V_{DS}=40V, I_D=20A, R_{DS(ON)} < 17m\Omega @ V_{GS}=10V$  (Typ:  $13m\Omega$ )

P-Channel:  $V_{DS}=-40V, I_D=-20A, R_{DS(ON)} < 50m\Omega @ V_{GS}=-10V$  (Typ:  $38m\Omega$ )

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low  $R_{DS(ON)}$ .
- 4) Excellent package for good heat dissipation.
- 5) MSL3



## Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
DOZ4614D	Z4614D	DFN3*3-8D	5000 pcs/Reel

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

Symbol	Parameter	N-Channel	P-Channel	Units
$V_{DS}$	Drain-Source Voltage	40	-40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D$	Continuous Drain Current- $T_C=25^\circ C$ <sup>1</sup>	20	-20	A
	Continuous Drain Current- $T_C=100^\circ C$ <sup>1</sup>	14	-14	
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	80	-80	A
$E_{AS}$	Single pulse avalanche energy <sup>3</sup>	20	12	mJ
$P_D$	Power Dissipation - $T_C=25^\circ C$	35	17	W
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

## Thermal Characteristics:

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Cast	3.6	7.1	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	60	62	$^\circ C/W$

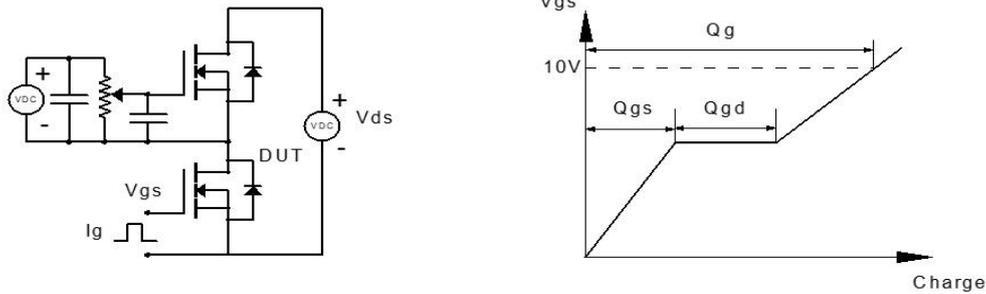
## N-Channel Electrical Characteristics: ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	40	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=40V$	---	---	1	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1	1.2	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance <sup>4</sup>	$V_{GS}=10V, I_D=10A$	---	13	17	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=5A$	---	22	27	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$	---	1000	---	pF
$C_{oss}$	Output Capacitance		---	346	---	
$C_{rss}$	Reverse Transfer Capacitance		---	11	---	
<b>Switching Characteristics<sup>4</sup></b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=20V, I_D=20A,$ $R_{REN}=1.6\ \Omega, V_{GS}=10V$	---	7.0	---	ns
$t_r$	Rise Time		---	1.2	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	9.5	---	ns
$t_f$	Fall Time		---	2.6	---	ns
$Q_g$	Total Gate Charge		$V_{GS}=10V, V_{DS}=20V,$ $I_D=19A$	---	13	---
$Q_{gs}$	Gate-Source Charge	---		5.7	---	nC
$Q_{gd}$	Gate-Drain "Miller" Charge	---		1.7	---	nC
<b>Drain-Source Diode Characteristics</b>						
$I_S$	Continuous Drain to Source Diode	$V_D=V_G=0V$	---	---	20	A
$I_{SM}$	Pulsed Drain to Source Diode		---	---	80	A
$V_{SD}$	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=20A$	---	---	1.2	V
$T_{rr}$	Reverse Recovery Time	$I_f=20A, T_J=25^\circ\text{C}$	---	20.5	---	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt=100A/\mu\text{s}$	---	14	---	nC

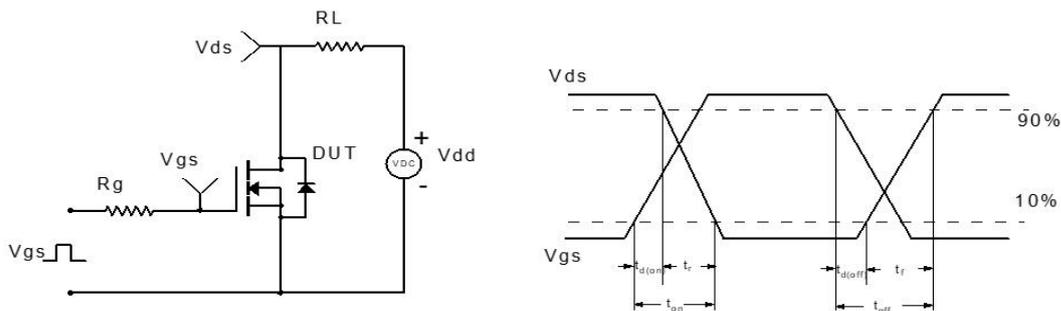
## Notes:

1. Computed continuous current assumes the condition of  $T_{j,Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition :  $T_J=25^{\circ}C, V_{DD}=20V, V_G=10V, L=0.1mH$
4. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 0.5\%$

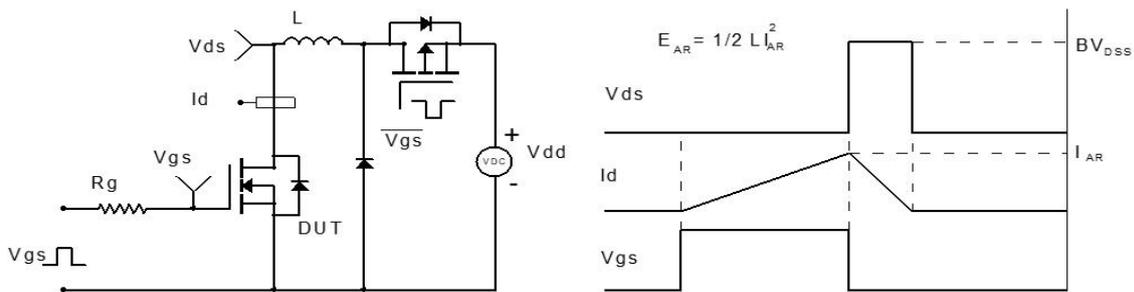
## Test Circuit



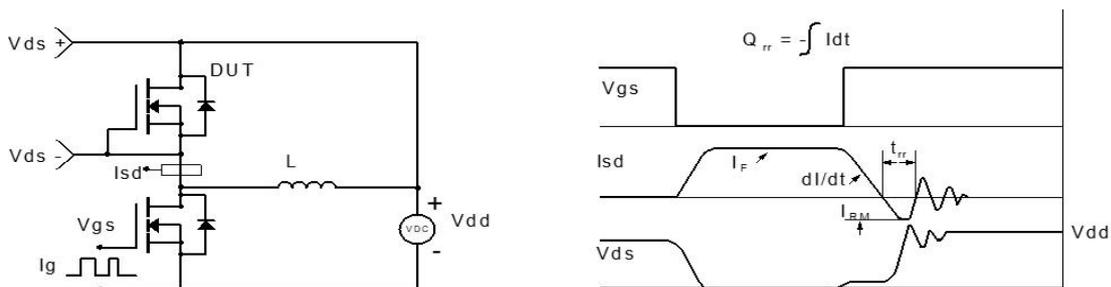
**Figure 1: Gate Charge Test Circuit & Waveform**



**Figure 2: Resistive Switching Test Circuit & Waveform**



**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**



**Figure 4: Diode Recovery Test Circuit & Waveform**

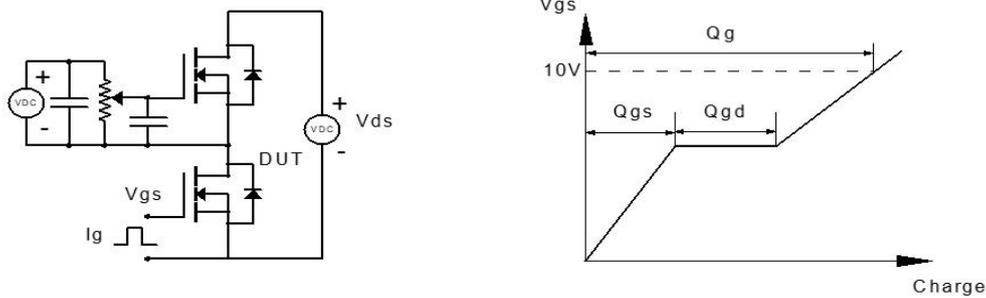
## P-Channel Electrical Characteristics: ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	-40	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-40V$	---	---	-1	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	-1	-1.6	-2.5	V
$R_{DS(on)}$	Drain-Source On Resistance <sup>4</sup>	$V_{GS}=-10V, I_D=-10A$	---	38	50	m $\Omega$
		$V_{GS}=-4.5V, I_D=-5A$	---	48	60	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V, f=1\text{MHz}$	---	770	---	pF
$C_{oss}$	Output Capacitance		---	106	---	
$C_{rss}$	Reverse Transfer Capacitance		---	79.4	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-20V, I_D=-5A$ $V_{GS}=-10V, R_{GEN}=2.4\ \Omega$	---	9	---	ns
$t_r$	Rise Time		---	21	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	26	---	ns
$t_f$	Fall Time		---	34	---	ns
$Q_g$	Total Gate Charge	$V_{GS}=-10V, V_{DS}=-20V,$ $I_D=-5A$	---	8	---	nC
$Q_{gs}$	Gate-Source Charge		---	3	---	nC
$Q_{gd}$	Gate-Drain "Miller" Charge		---	2	---	nC
<b>Drain-Source Diode Characteristics</b>						
$I_S$	Continuous Drain to Source Diode	$V_D=V_G=0V$	---	---	-20	A
$I_{SM}$	Pulsed Drain to Source Diode		---	---	-80	---
$T_{rr}$	Reverse Recovery Time	$I_F=-5A, T_J=25^\circ\text{C}$	---	14	---	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt=100A/\mu\text{s}$	---	9	---	nC
$V_{SD}$	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=-6A$	---	---	-1.2	V

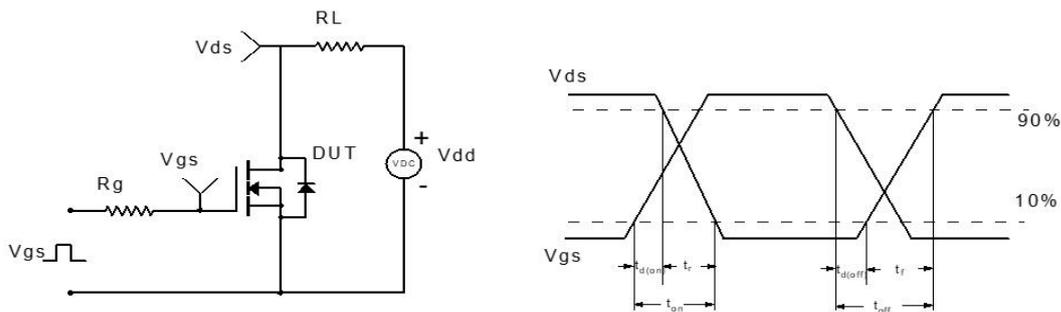
## Notes:

1. Computed continuous current assumes the condition of  $T_{j,Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition :  $T_J=25^{\circ}C, V_{DD}=-20V, V_G=-10V, L=0.1mH$
4. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 0.5\%$

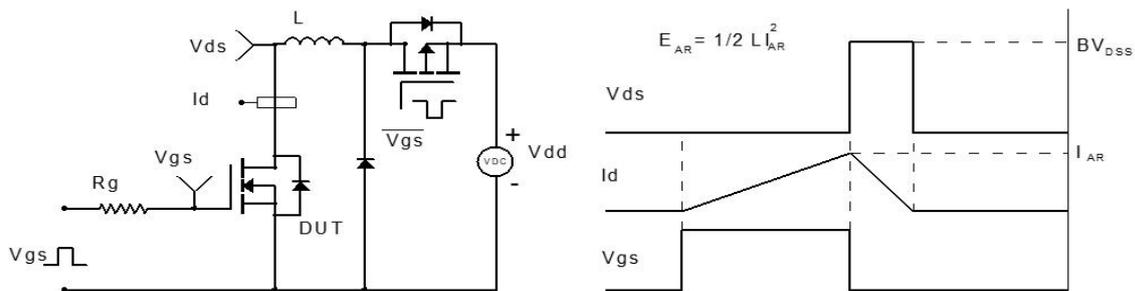
## Test Circuit



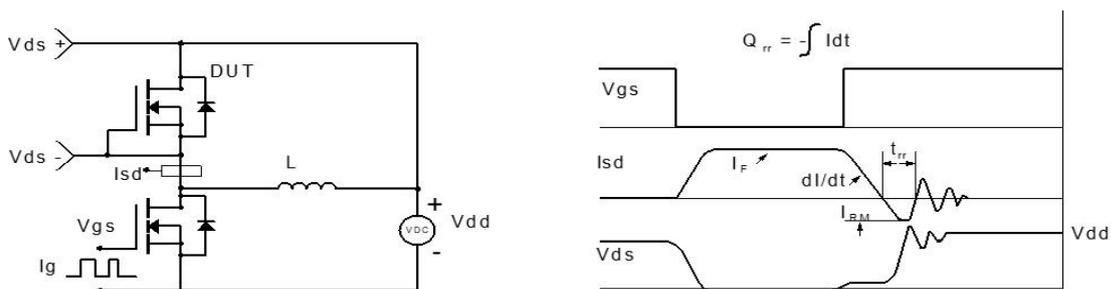
**Figure 1: Gate Charge Test Circuit & Waveform**



**Figure 2: Resistive Switching Test Circuit & Waveform**

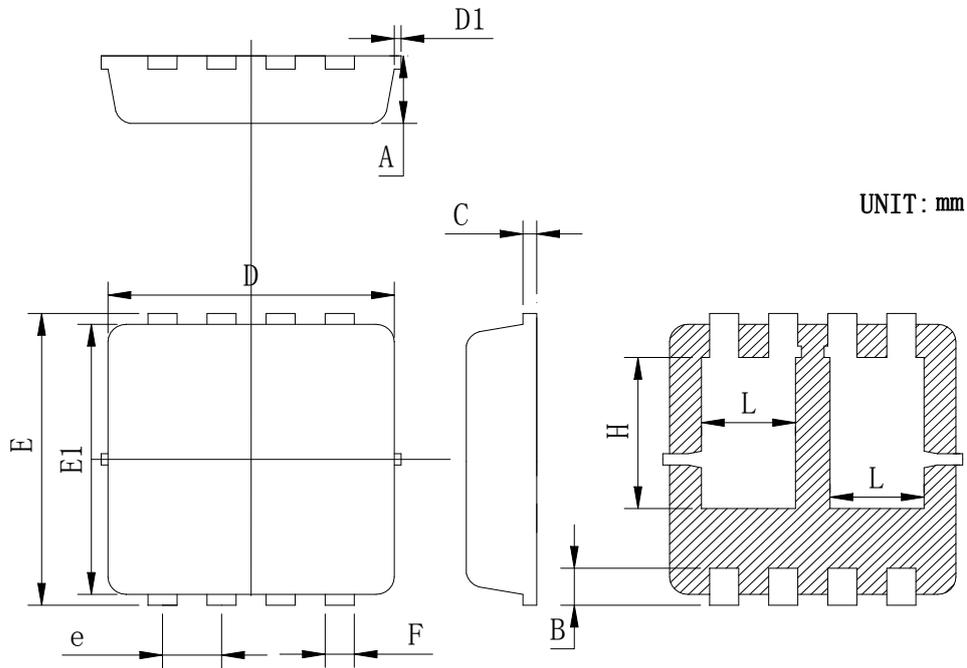


**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**



**Figure 4: Diode Recovery Test Circuit & Waveform**

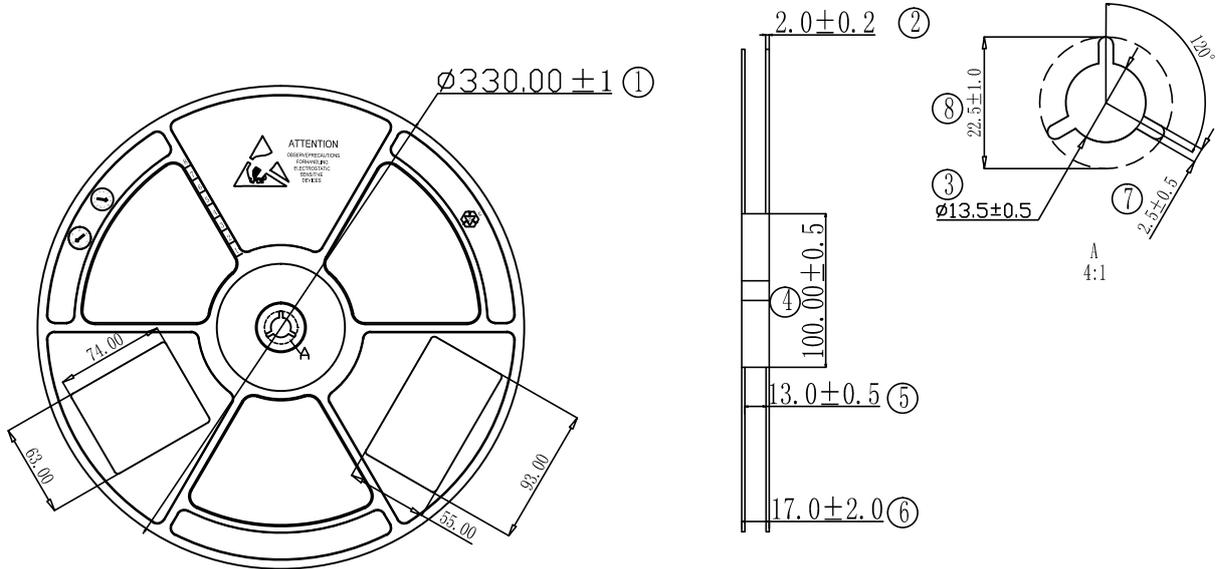
## DFN3X3-8D Package Outline Data



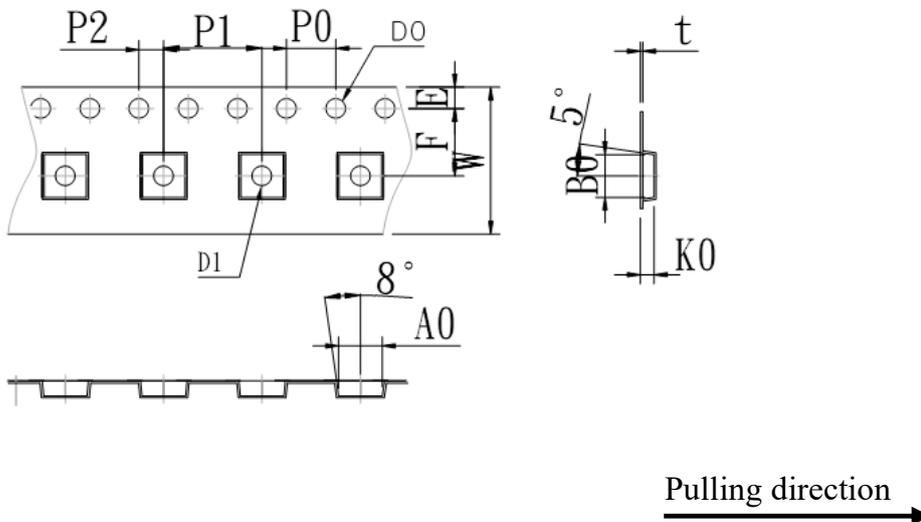
Symbol	Min	Typ	Max
A	0.725	0.775	0.825
B	0.28	0.38	0.48
C	0.13	0.15	0.20
D	3.05	3.15	3.25
D1			0.10
E	3.25	3.35	3.45
E1	3.0	3.1	3.2
e	0.60	0.65	0.70
F	0.27	0.32	0.37
H	1.63	1.73	1.83
L	0.93	1.03	1.13

## Tape & Reel Information

Dimensions in mm



Symbol	A0	B0	K0	D0	D1	P0	P1	10*P0
Spec	3.55±0.10	3.45±0.10	1.13±0.10	1.55±0.10	1.55±0.10	4.00±0.10	8.00±0.10	40.0±0.10
Symbol	W	E	F	P2	t			
Spec	12.00±0.10	1.75±0.10	5.50±0.10	2.00±0.10	0.20±0.05			



## Marking Information:

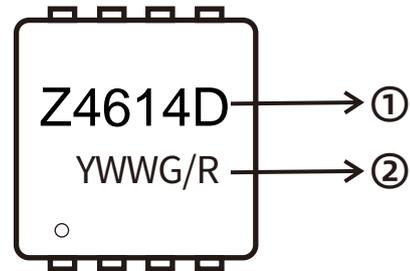
①:Part NO.

②: Date Code (YWWG / R)

Y: Year Code , last digit of the year

WW : Week Code (01-53)

G/R: G(Green) R(L/ead Free)



## Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-04-23	Release of final version

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