

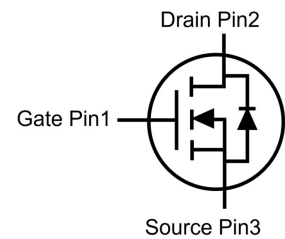
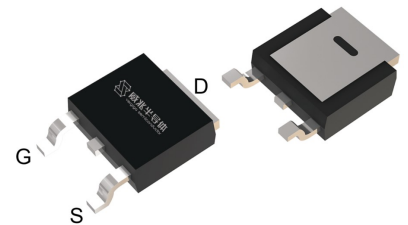
## Features

- Enhancement mode
- Very low on-resistance  $R_{DS(on)}$
- VitoMOS<sup>®</sup> II Technology
- Fast Switching and High efficiency
- 100% Avalanche test



Part ID	Package Type	Marking	Packing
VSD007N04MS-G	TO-252	007N04M	2500PCS/Reel

$V_{DS}$	40	V
$R_{DS(on),TYP@ V_{GS}=10V}$	3.6	m $\Omega$
$R_{DS(on),TYP@ V_{GS}=4.5V}$	5.3	m $\Omega$
$I_D$	90	A

**TO-252**


## Maximum ratings, at $T_A = 25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	40	V
$V_{GS}$	Gate-Source voltage	$\pm 20$	V
$I_S$	Diode continuous forward current	$T_C = 25^\circ\text{C}$	90 A
$I_D$	Continuous drain current @ $V_{GS}=10V$	$T_C = 25^\circ\text{C}$	90 A
		$T_C = 100^\circ\text{C}$	64 A
$I_{DM}$	Pulse drain current tested ①	$T_C = 25^\circ\text{C}$	360 A
$I_{DSM}$	Continuous drain current @ $V_{GS}=10V$	$T_A = 25^\circ\text{C}$	14 A
		$T_A = 70^\circ\text{C}$	11 A
$E_{AS}$	Avalanche energy, single pulsed ②	45	mJ
$P_D$	Maximum power dissipation	$T_C = 25^\circ\text{C}$	51 W
$P_{DSM}$	Maximum power dissipation ③	$T_A = 25^\circ\text{C}$	1.3 W
$T_{STG,TJ}$	Storage and Junction Temperature Range	-55 to 175	$^\circ\text{C}$

## Thermal Characteristics

Symbol	Parameter	Typical	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.95	3.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100	120	$^\circ\text{C/W}$

**Electrical Characteristics**

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ T<sub>j</sub>=25°C (unless otherwise stated)</b>						
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	--	--	V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T <sub>j</sub> =125°C)	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	--	--	100	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.7	2.3	V
RDS(on)	Drain-Source On-State Resistance ④	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	--	3.6	4.5	mΩ
		T <sub>j</sub> =100°C	--	4.3	--	mΩ
RDS(on)	Drain-Source On-State Resistance ④	V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	--	5.3	6.6	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
Ciss	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1MHz	970	1295	1720	pF
Coss	Output Capacitance		370	490	650	pF
Crss	Reverse Transfer Capacitance		20	30	40	pF
Rg	Gate Resistance	f=1MHz	0.2	1.5	3	Ω
Qg(10V)	Total Gate Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V	--	27	36	nC
Qg(4.5V)			--	14	19	nC
Qgs	Gate-Source Charge		--	4.4	5.9	nC
Qgd	Gate-Drain Charge		--	6.1	9.2	nC
<b>Switching Characteristics</b>						
Td(on)	Turn-on Delay Time	V <sub>DD</sub> =20V, I <sub>D</sub> =30A, R <sub>G</sub> =3Ω, V <sub>GS</sub> =10V	--	7.2	--	ns
Tr	Turn-on Rise Time		--	61	--	ns
Td(off)	Turn-Off Delay Time		--	24	--	ns
Tf	Turn-Off Fall Time		--	33	--	ns
<b>Source- Drain Diode Characteristics@ T<sub>j</sub> = 25°C (unless otherwise stated)</b>						
VSD	Forward on voltage	I <sub>SD</sub> =30A, V <sub>GS</sub> =0V	--	0.9	1.2	V
Trr	Reverse Recovery Time	T <sub>j</sub> =25°C, I <sub>sd</sub> =30A, V <sub>GS</sub> =0V	--	19	38	ns
Qrr	Reverse Recovery Charge	di/dt=100A/μs	--	6.7	13.5	nC

NOTE:

- ① Repetitive rating; pulse width limited by max junction temperature.
- ② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.1mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 30A, V<sub>GS</sub> = 10V. Part not recommended for use above this value
- ③ The power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C.
- ④ Pulse width ≤ 380μs; duty cycle ≤ 2%.

Typical Characteristics

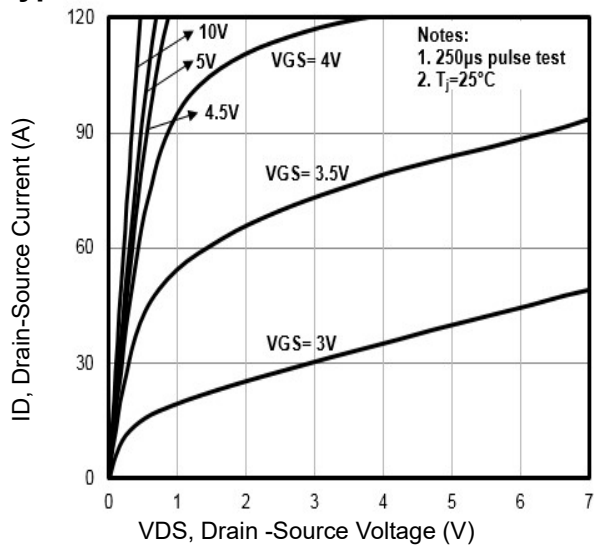


Fig1. Typical Output Characteristics

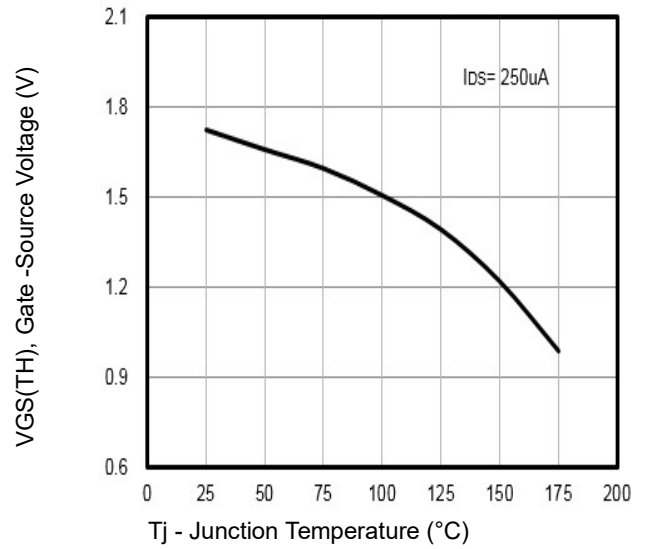


Fig2. V<sub>GS(TH)</sub> Gate-Source Voltage Vs. T<sub>j</sub>

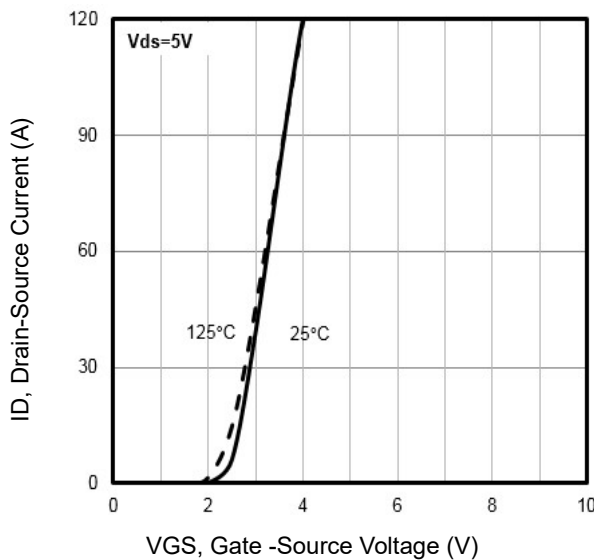


Fig3. Typical Transfer Characteristics

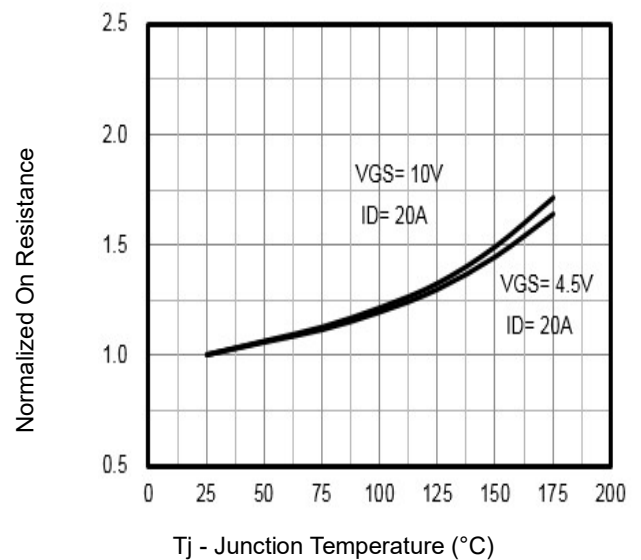


Fig4. Normalized On-Resistance Vs. T<sub>j</sub>

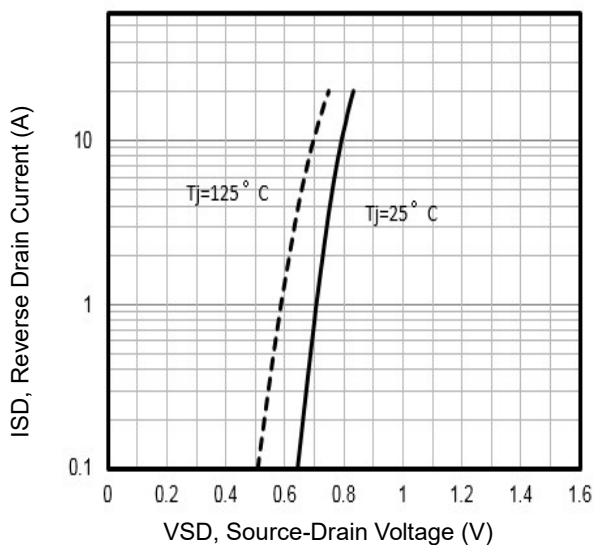


Fig5. Typical Source-Drain Diode Forward Voltage

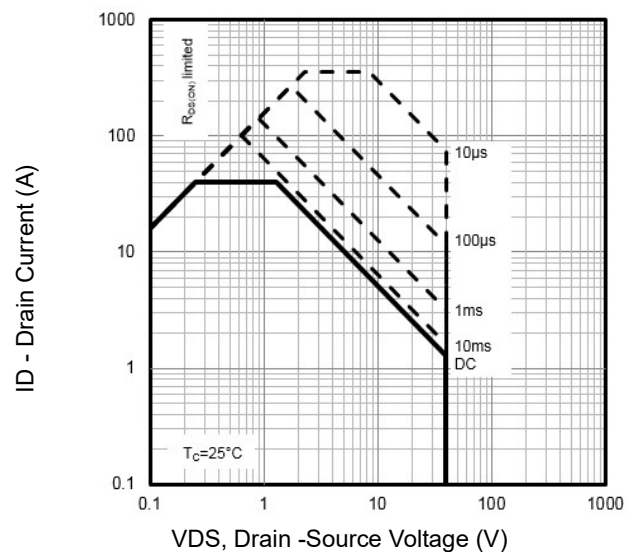


Fig6. Maximum Safe Operating Area

Typical Characteristics

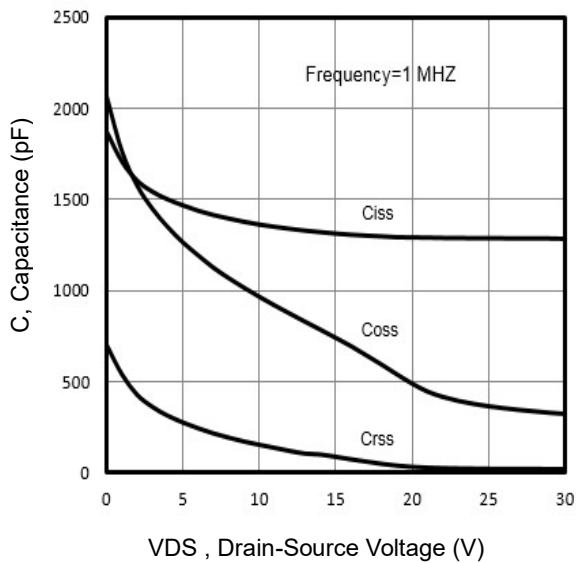


Fig7. Typical Capacitance Vs.Drain-Source Voltage

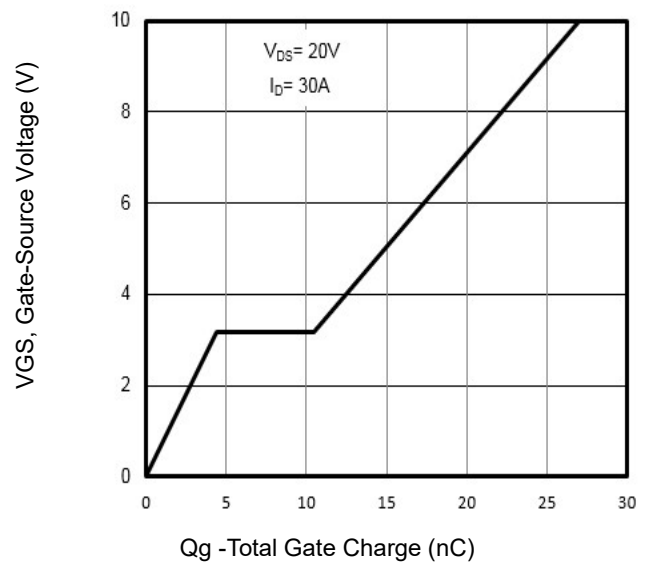


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

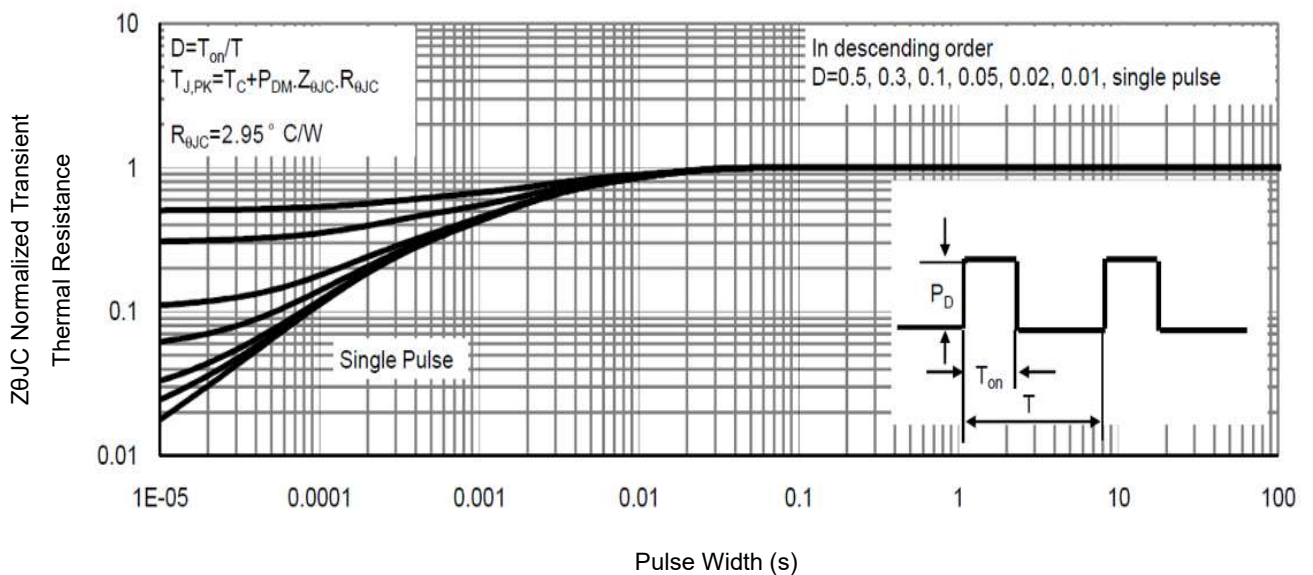


Fig9. Normalized Maximum Transient Thermal Impedance

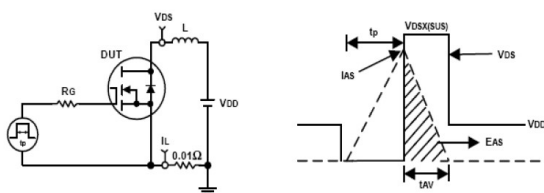


Fig10. Unclamped Inductive Test Circuit and waveforms

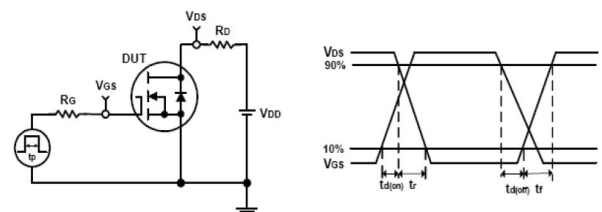
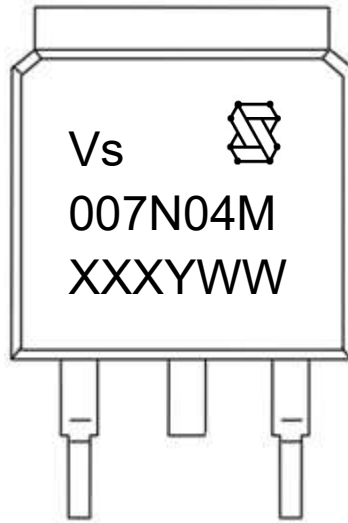


Fig11. Switching Time Test Circuit and waveforms

**Marking Information**



1st line: Vergiga Code (Vs), Vergiga Logo

2nd line: Part Number (007N04M)

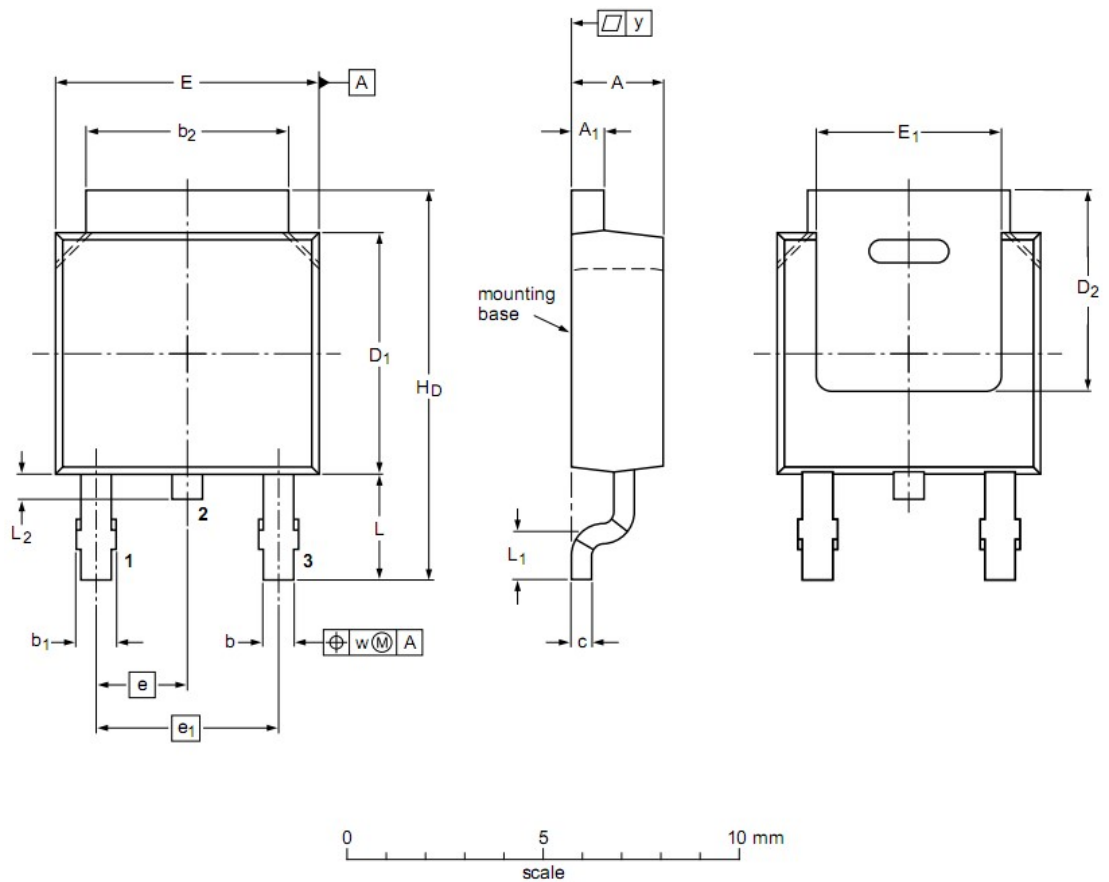
3rd line: Date code (XXXYWW)

XXX: Wafer Lot Number Code , code changed with Lot Number

Y: Year Code , refer to table below

WW: Week Code (01 to 53)

Code	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

**TO-252 Package Outline Data**


Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
<b>A</b>	2.20	2.30	2.38
<b>A<sub>1</sub></b>	0.46	0.50	0.63
<b>b</b>	0.64	0.76	0.89
<b>b<sub>1</sub></b>	0.77	0.85	1.14
<b>b<sub>2</sub></b>	5.00	5.33	5.46
<b>c</b>	0.458	0.508	0.558
<b>D<sub>1</sub></b>	5.98	6.10	6.223
<b>D<sub>2</sub></b>	5.21	--	--
<b>E</b>	6.40	6.60	6.731
<b>E<sub>1</sub></b>	4.40	--	--
<b>e</b>	2.286 BSC		
<b>e<sub>1</sub></b>	--	4.57	--
<b>H<sub>D</sub></b>	9.40	10.00	10.40
<b>L</b>	2.743 REF		
<b>L<sub>1</sub></b>	1.40	1.52	1.77
<b>L<sub>2</sub></b>	0.50	0.80	1.01
<b>w</b>	--	0.20	--
<b>y</b>	--	--	0.20

**Notes:**

1. Refer to JEDEC TO-252 variation AA
2. Dimension "E" does NOT include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.1524mm per side.
3. Dimension "D1" does NOT include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.1524mm per end.

**Customer Service**
**Sales and Service:**
[sales@vgsemi.com](mailto:sales@vgsemi.com)
**Vergiga Semiconductor CO., LTD**
**TEL:** (86-755) -26902410

**FAX:** (86-755) -26907027

**WEB:** [www.vgsemi.com](http://www.vgsemi.com)