

• General Description

It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for This device is ideal for motor driver, load switch and DC-DC applications.

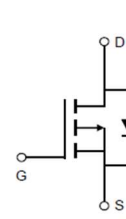
• Features

- Advance Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

• Application

- BLDC Motor driver
- Load Switch
- DC-DC

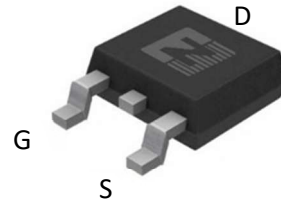
• Product Summary



$$V_{DS} = -40V$$

$$R_{DS(ON)} = 6.8m\Omega$$

$$I_D = -55A$$



TO-252

• Ordering Information:

Part NO.	ZM060P04D
Marking	ZM060P04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

• Absolute Maximum Ratings ($T_C = 25^\circ C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current	$I_D @ T_C = 25^\circ C$	-55	A
	$I_D @ T_C = 75^\circ C$	-41	A
	$I_D @ T_C = 100^\circ C$	-34	A
Pulsed Drain Current ^①	I_{DM}	-165	A
Total Power Dissipation	$P_D @ T_C = 25^\circ C$	60	W
Total Power Dissipation	$P_D @ T_A = 25^\circ C$	2.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	180	mJ
ESD Level (HBM)		Class 2	

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	2.0	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	62.5	° C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	260	° C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu A$	-1.3		-2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -40V, V_{GS} = 0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -40A$		6.8	8.8	m Ω
		$V_{GS} = -4.5V, I_D = -25A$		9.5	12	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = -10V, I_D = -10A$		28		s
Source-drain voltage	V_{SD}	$I_s = 40A$			1.28	V

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz $V_{DS} = -25V$	-	6210	-	pF
Output capacitance	C_{oss}		-	468	-	
Reverse transfer capacitance	C_{rss}		-	397	-	

•Gate Charge characteristics($T_a = 25^\circ C$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	$V_{DD} = -25V$ $I_D = -5A$ $V_{GS} = -10V$	-	106	-	nC
Gate - Source charge	Q_{gs}		-	13	-	
Gate - Drain charge	Q_{gd}		-	20	-	

Fig.1 Power Dissipation Derating Curve

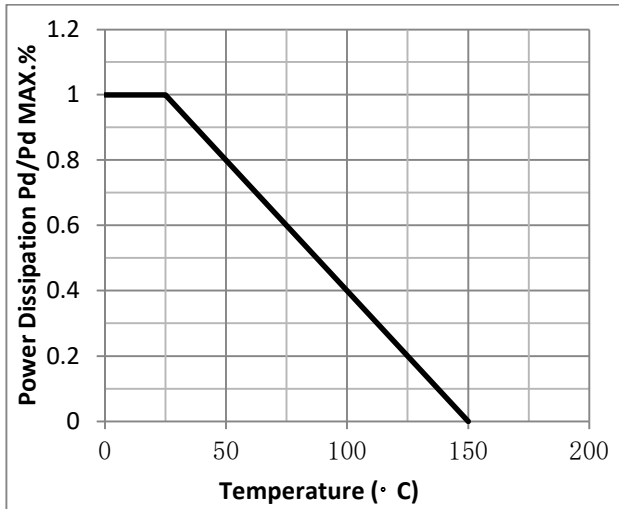


Fig.2 Typical output Characteristics

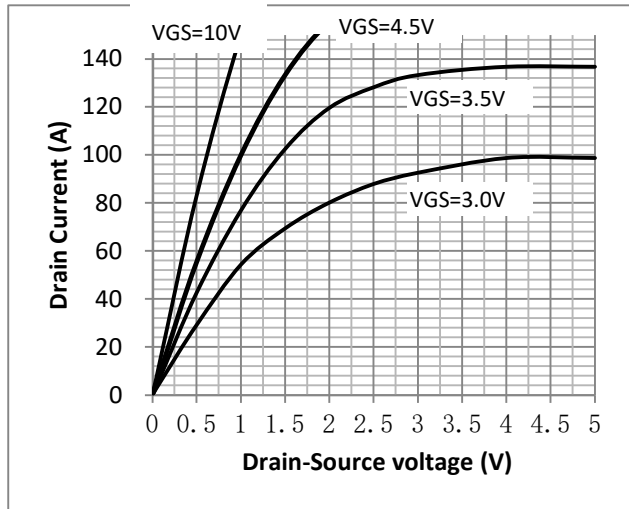


Fig.3 Threshold Voltage V_{GS(th)} V.S Junction Temperature

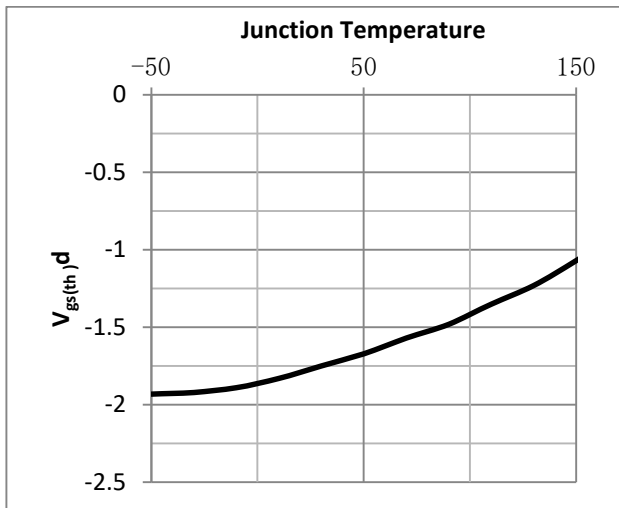


Fig.4 Resistance V.S Drain Current

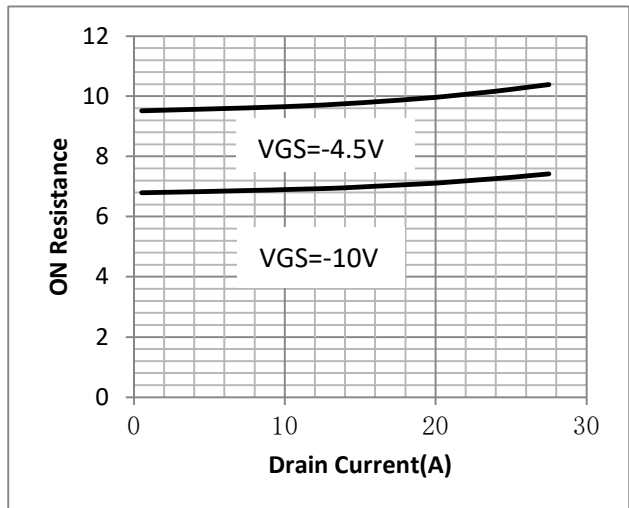


Fig.5 On-Resistance VS Gate Source Voltage

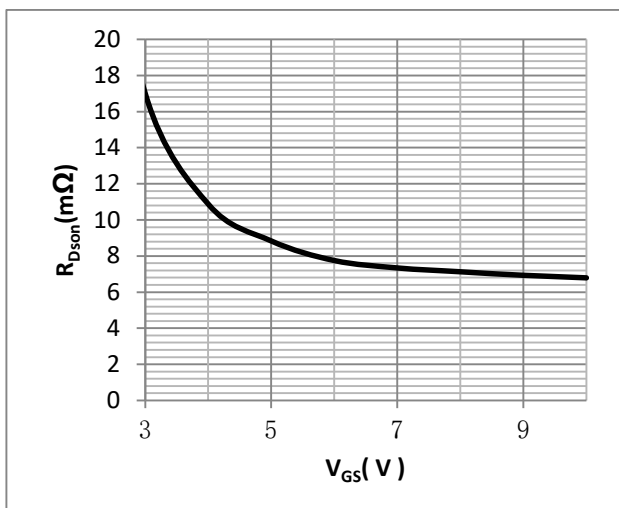


Fig.6 On-Resistance V.S Junction Temperature

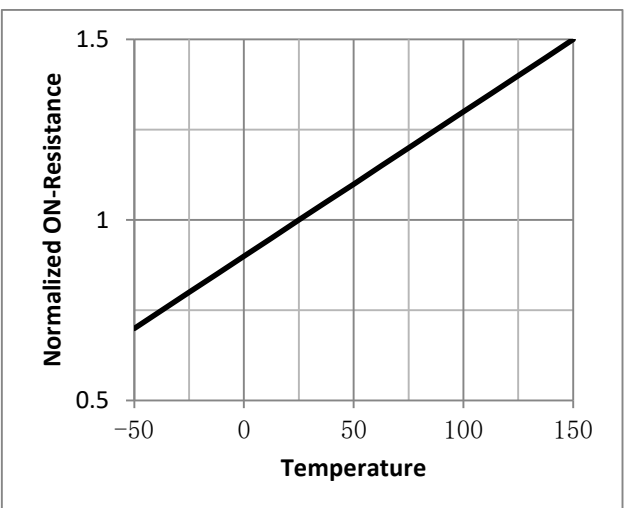


Fig.7 SOA Maximum Safe Operating Area

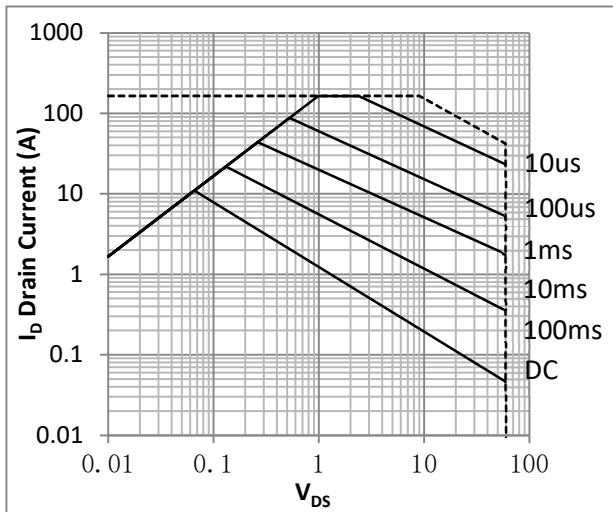


Fig.8 I_D -Junction Temperature

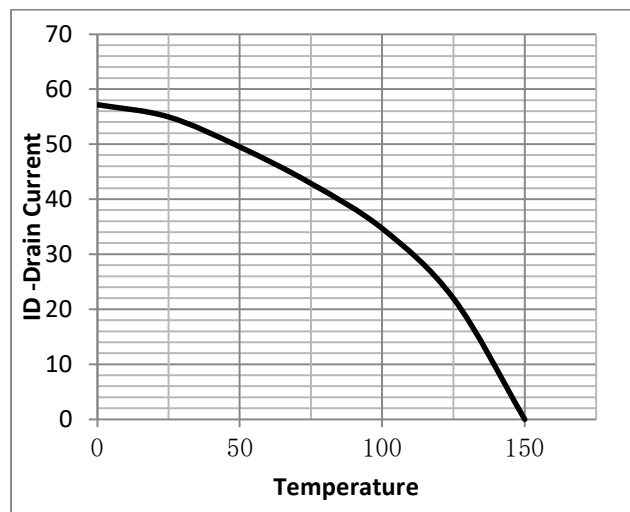


Figure.9 Diode Forward Voltage vs. Current

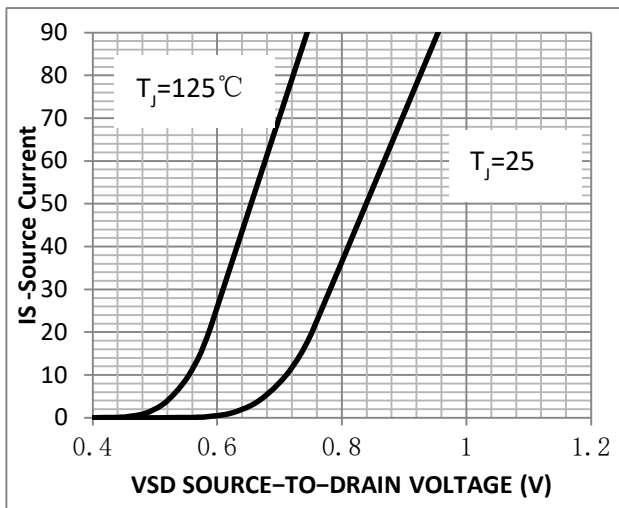


Figure.10 Transfer Characteristics

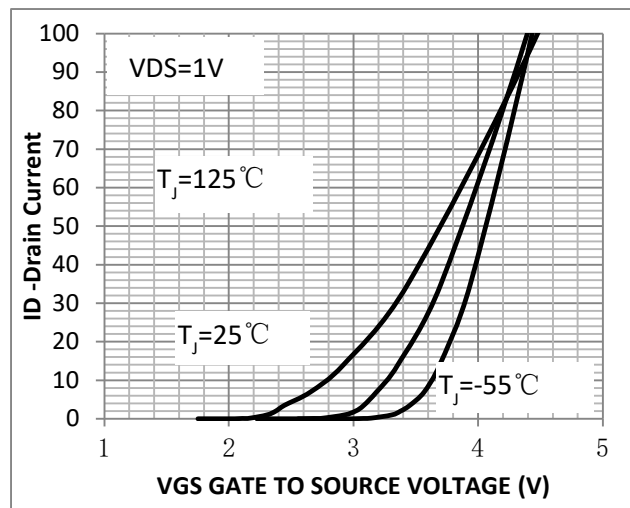


Fig.11 Gate Charge Characteristics

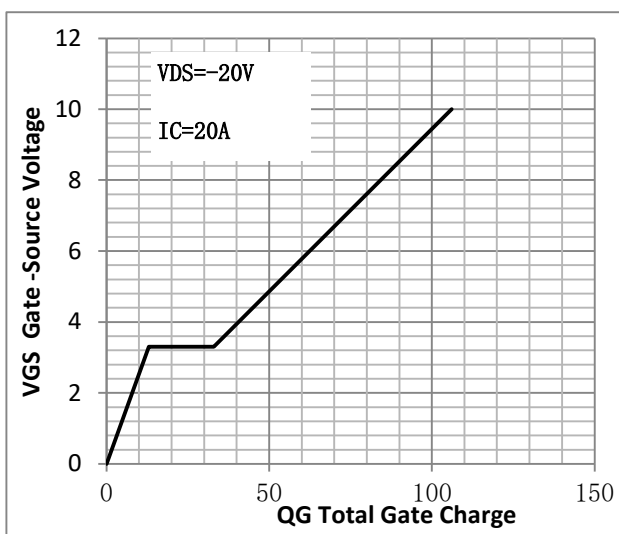


Fig.12 Capacitance vs V_{DS}

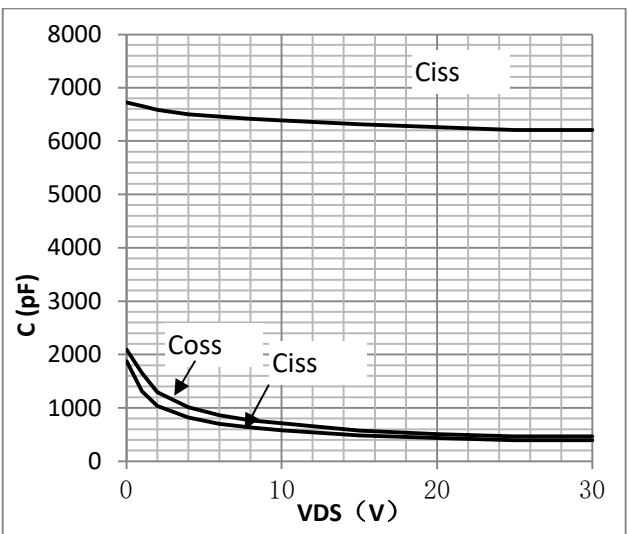


Fig.13 Switching Time Measurement Circuit

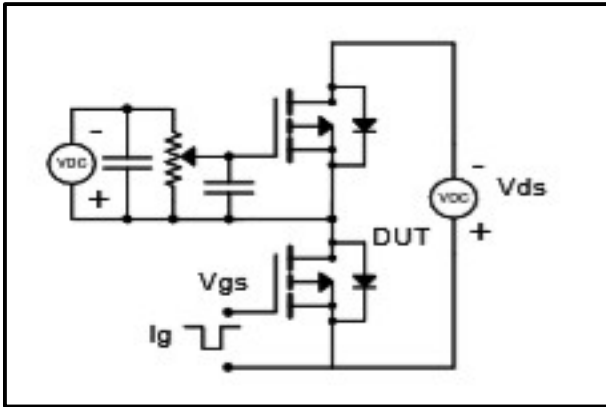


Fig.14 Gate Charge Waveform

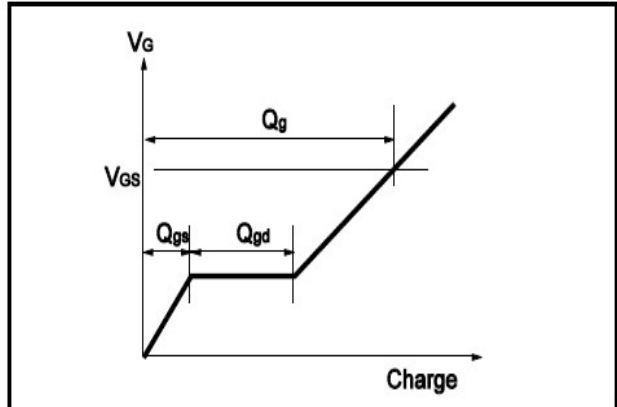


Fig.15 Switching Time Measurement Circuit

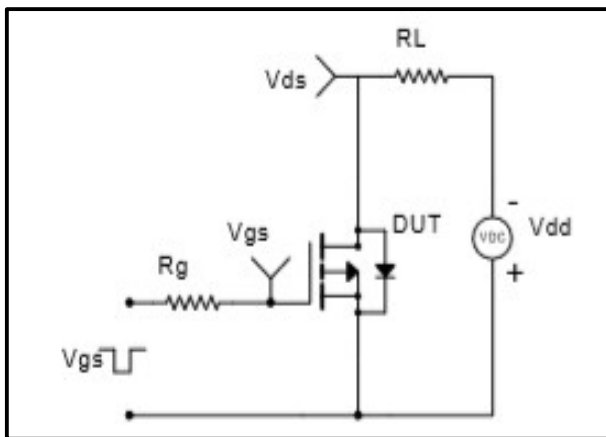


Fig.16 Gate Charge Waveform

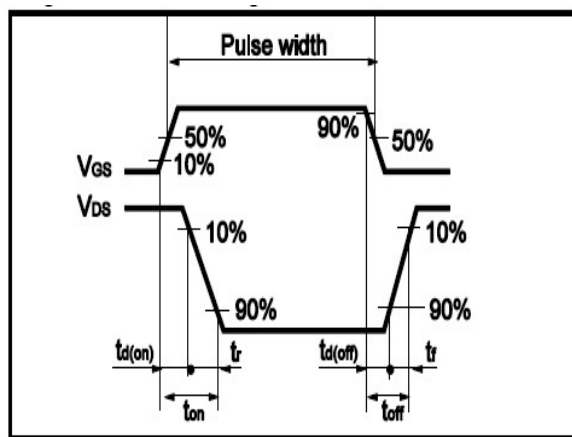


Fig.17 Avalanche Measurement Circuit

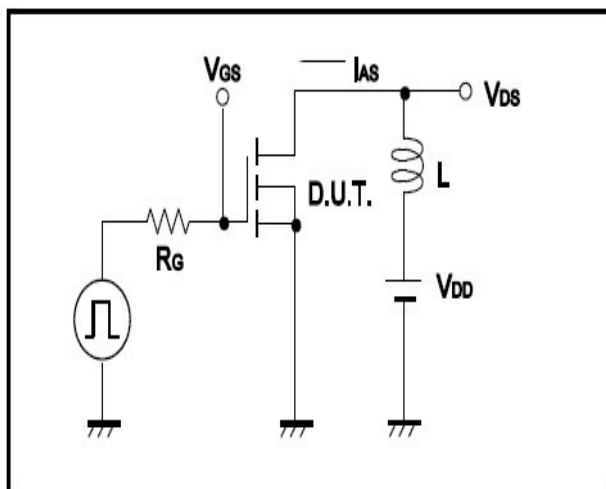
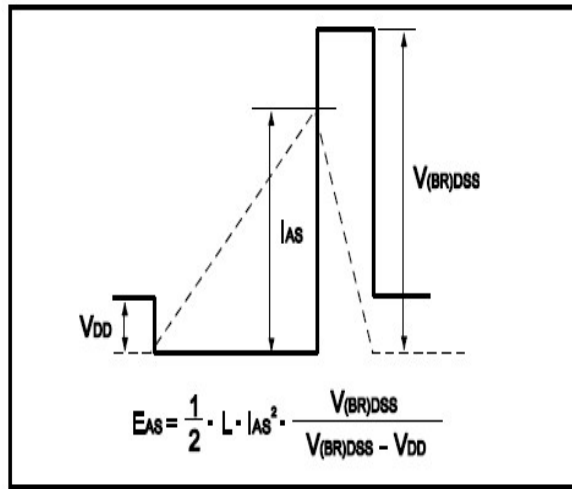


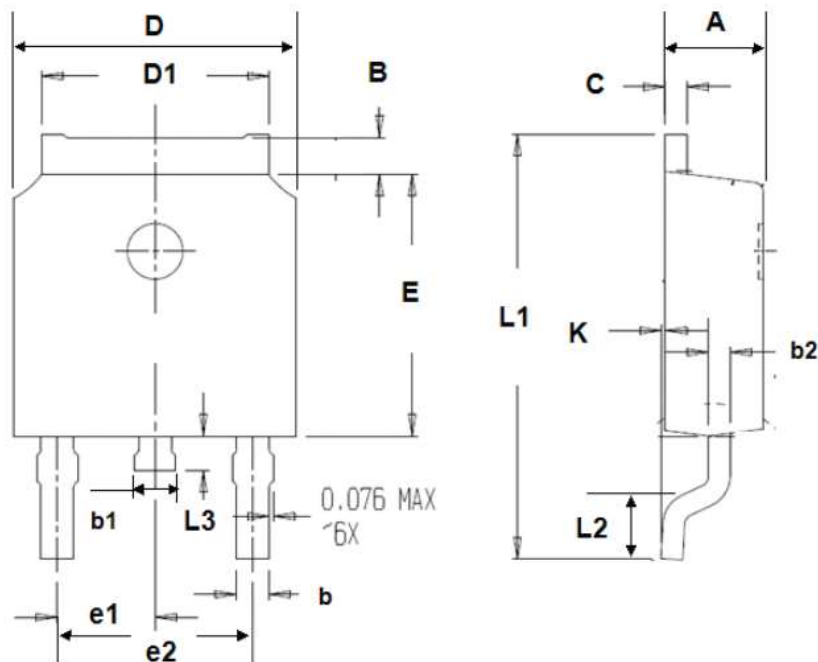
Fig.18 Avalanche Waveform



**•Dimensions (TO-252)**

Unit: mm

SYMBOL	min	max	SYMBOL	min	max
A	2.10	2.50	B	0.85	1.25
b	0.50	0.80	b1	0.50	0.90
b2	0.45	0.70	C	0.45	0.70
D	6.30	6.75	D1	5.10	5.50
E	5.30	6.30	e1	2.25	2.35
L1	9.20	10.60	e2	4.45	4.75
L2	0.90	1.75	L3	0.60	1.10
K	0.00	0.23			

Note: ① Pulse test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$;