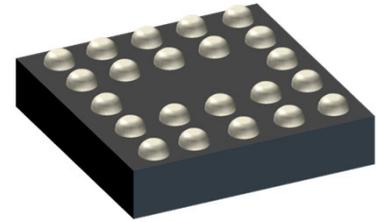


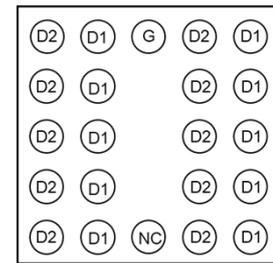
40V BiGaN Enhancement-mode FET

Description

40V Normally-OFF GaN			
$V_{DS}(V)$	$R_{DD(on)}(m\Omega)$	$I_D(A)$	$Q_G(nC)$
40	5.0	20	12.7



Pin1
Bottom View



Pin1

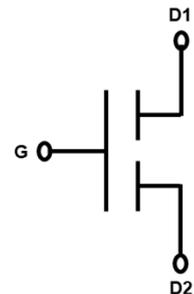
Bottom View

Feature

- Bi-directional blocking capability
- GaN-on-Silicon E-mode HEMT technology
- Ultra-low on Resistance
- Package: WLCSP 2.1x2.1

Applications

- High side load switch
- OVP protection in smart phone USB port
- Switch circuits in multiple power suppliers system



Circuit Diagram

Absolute maximum rating@25°C

Rating	Symbol	Value	Units
Drain1-Drain2 Voltage or Drain2-Drain1 Voltage	V_{DD}	40	V
Continuous Drain Current	I_D	20	A
Pulsed Drain Current ($T_c=25^\circ C$, t_p limited by T_{jmax})	$I_{D(pulse)}$	100	A
Power dissipation ($T_{c, board} = 25^\circ C$)	P_{tot}	14	W
Drain-Gate Voltage	V_{DG}	40	V
Gate-Drain Voltage	V_{GD}	6	V
Operating Temperature	T_J	-40 to 125	°C
Storage Temperature	T_{STG}	-40 to 150	°C

Thermal characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Thermal Resistance, Junction-to-Case (top)	$R_{\theta JC_top}$	-	12.7	-	°C/W
Thermal Resistance, Junction-to-Case (bottom)	$R_{\theta JC_bot}$	-	7	-	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	-	51.7	-	°C/W

Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Drain1-Drain2 Breakdown Voltage	BV_{D1D2S}	$V_G = V_{D2} = 0V, I_{D1D2} = 500\mu A$	40	-	-	V
Drain1-Drain2 Breakdown Voltage	BV_{D2D1S}	$V_G = V_{D1} = 0V, I_{D2D1} = 500\mu A$	40	-	-	V
Gate Threshold Voltage	$V_{GD1(th)}$	$V_{D2} = V_G, V_{D1} = 0V, I_{D2D1} = 1mA$	0.8	-	2.4	V
Gate Threshold Voltage	$V_{GD2(th)}$	$V_{D1} = V_G, V_{D2} = 0V, I_{D1D2} = 1mA$	0.8	-	2.4	V
Zero Gate Voltage Drain Current	I_{D1D2S}	$V_{D1} = 40V, V_G = V_{D2} = 0V$	-	-	20	μA
Zero Gate Voltage Drain Current	I_{D2D1S}	$V_{D2} = 40V, V_G = V_{D1} = 0V$	-	-	20	μA
Gate-Source Leakage Current	I_{GDS}	$V_G = 5V, V_{D1} = V_{D2} = 0V$	-	-	3.0	μA
		$V_G = -5V, V_{D1} = V_{D2} = 0V$	-1.0	-	-	
Gate-Source Leakage Current	I_{GDS}	$V_G = 6V, V_{D1} = V_{D2} = 0V$	-	-	30	μA
		$V_G = -6V, V_{D1} = V_{D2} = 0V$	-1.0	-	-	
Drain1-Drain2 On-State Resistance	$R_{D1D2(ON)}$	$V_{GD2} = 5V, I_{D1D2} = 10A$	-	5.0	6.0	m Ω
Drain2-Drain1 On-State Resistance	$R_{D2D1(ON)}$	$V_{GD1} = 5V, I_{D2D1} = 10A$	-	5.0	6.0	m Ω
Input Capacitance	C_{iss}	$V_G = 0V, V_D = 20V$	-	648	-	pF
Output Capacitance	C_{oss}		-	281	-	
Reverse Transfer Capacitance	C_{rss}		-	170	-	
Total Gate Charge	Q_G	$V_G = 5V, V_D = 20V, I_D = 10A$	-	12.7	-	nC
Gate-Drain1 Charge	Q_{GD1}	$V_{D1} = 20V, I_D = 10A$	-	2.5	-	
Gate-Drain2 Charge	Q_{GD2}	$V_{D1} = 20V, I_D = 10A$	-	6.9	-	
Gate-Drain2 Charge	Q_{GD2}	$V_{D2} = 20V, I_D = 10A$	-	2.5	-	
Gate-Drain1 Charge	Q_{GD1}	$V_{D2} = 20V, I_D = 10A$	-	6.9	-	
Output Charge	Q_{OSS}	$V_G = 0V, V_D = 20V$	-	8.5	-	
Gate Resistance	R_G	f=1MHz	-	3	-	Ω

Typical Characteristics

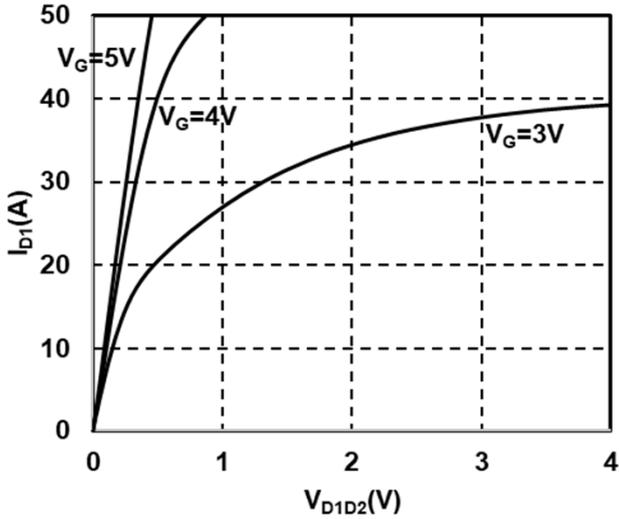


Fig.1 Output Characteristics

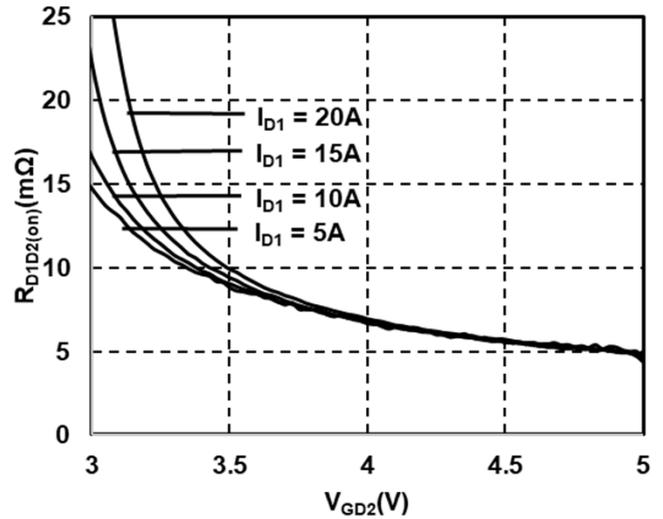


Fig.2 Typical Drain On-state Resistance

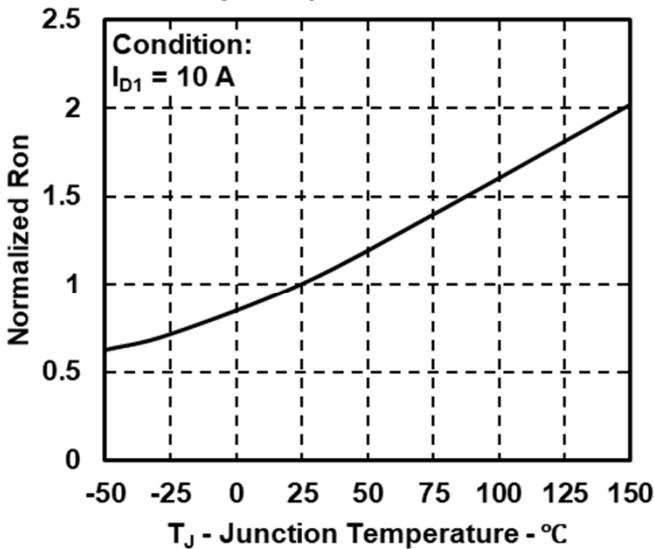


Fig.3 Typical On Resistance vs. Temperature

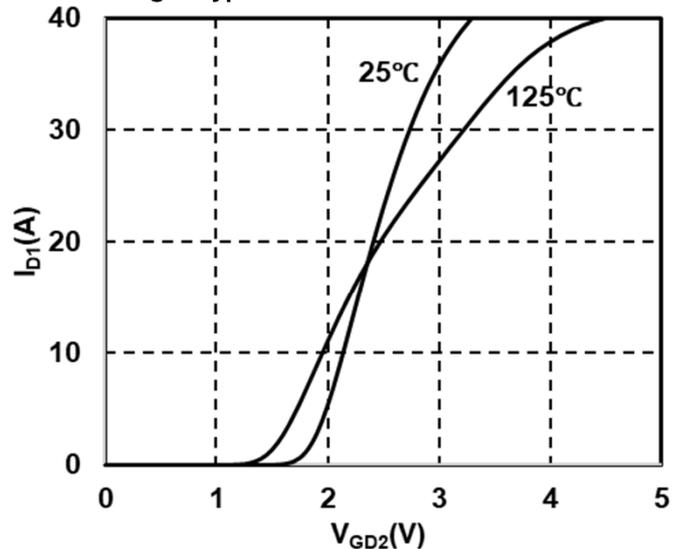


Fig.4 Typical Transfer Characteristic

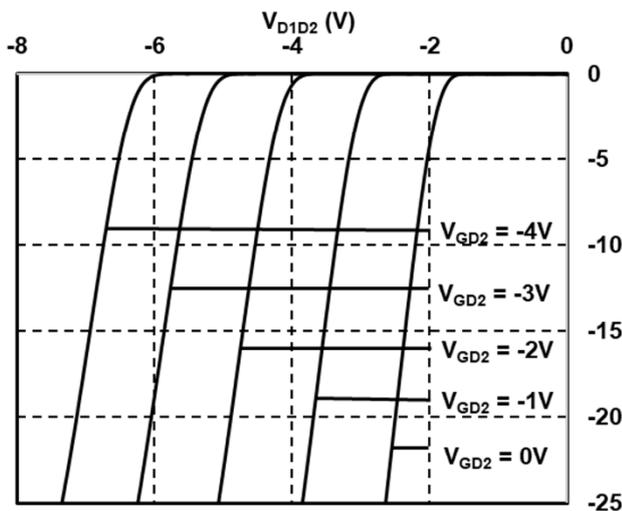


Fig.5 Typ. Reverse Drain1- Drain2 Characteristics ($V_{GD2} \leq 0V, T_J = 25^\circ C$)

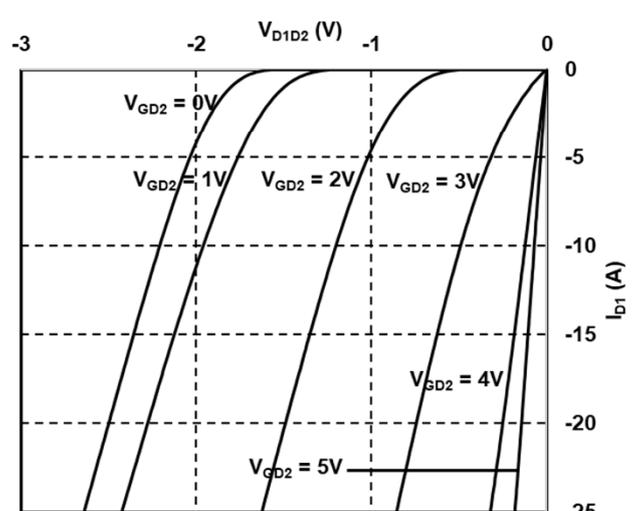


Fig.6 Typ. Reverse Drain1- Drain2 Characteristics ($V_{GD2} \geq 20V, T_J = 25^\circ C$)

Typical Characteristics

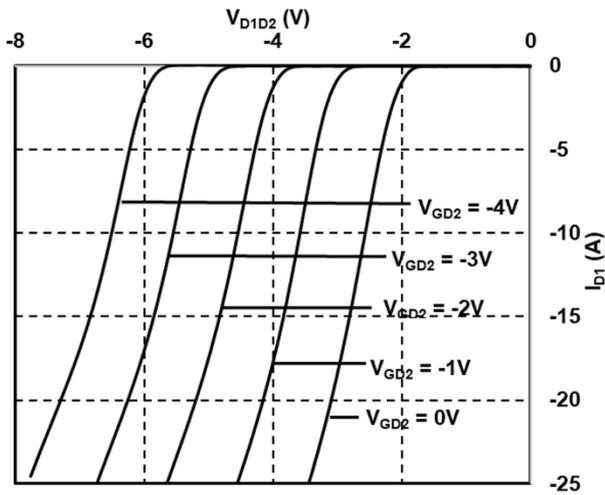


Fig.7 Typ. Reverse Drain1- Drain2 Characteristics ($V_{GD2} \leq 0V, T_J = 125^\circ C$)

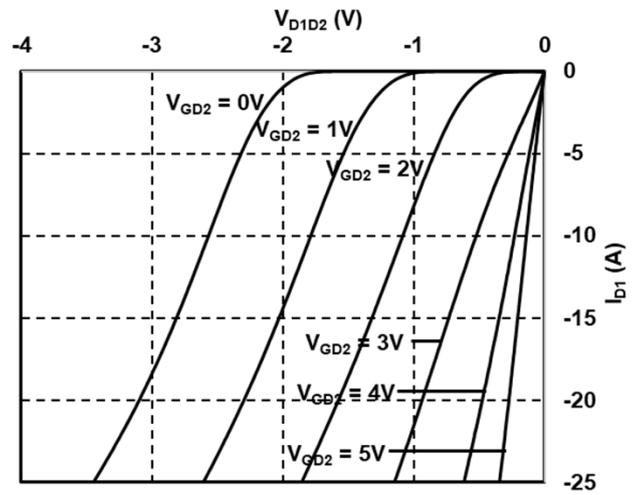


Fig.8 Typ. Reverse Drain1- Drain2 Characteristics ($V_{GD2} \geq 0V, T_J = 125^\circ C$)

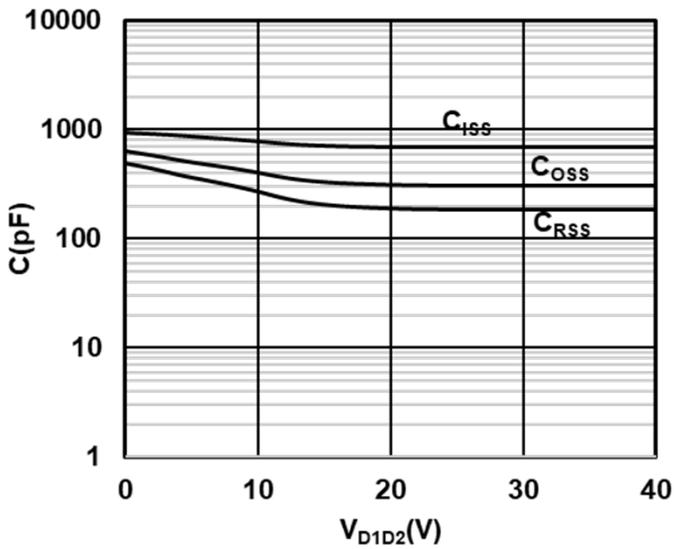


Fig.9 Typical Junction Capacitance

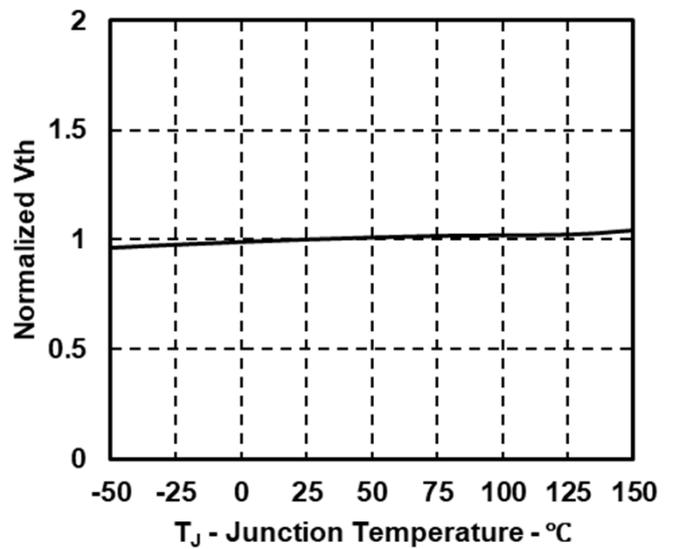


Fig.10 Normalized Threshold Voltage vs. Temp

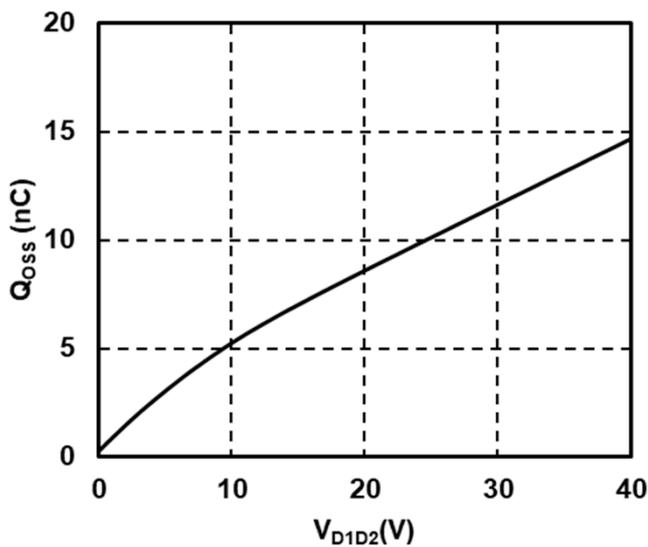


Fig.11 Output Charge

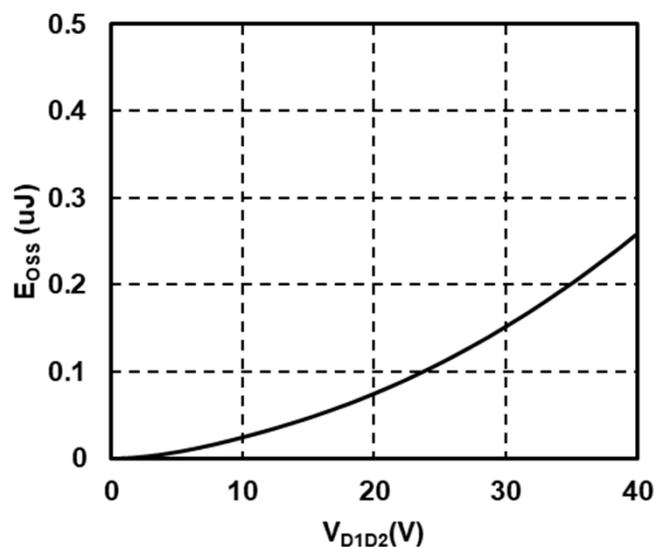


Fig.12 Output Capacitance Stored Energy

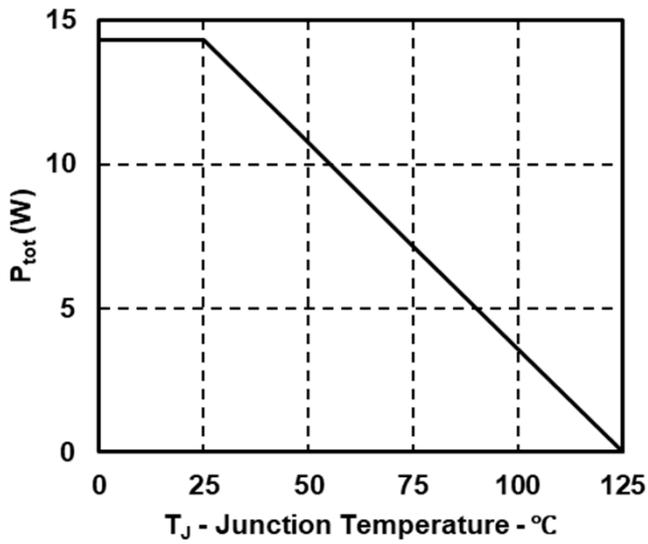


Fig.13 Power Dissipation

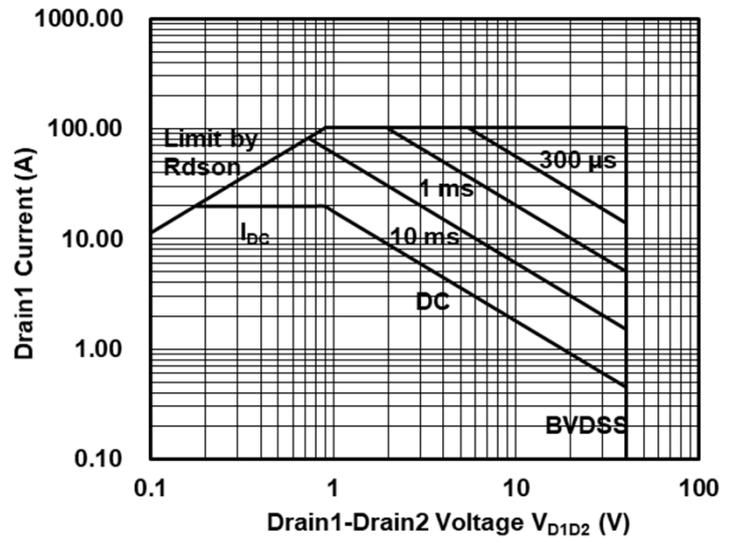


Fig.14 Safe Operating Area

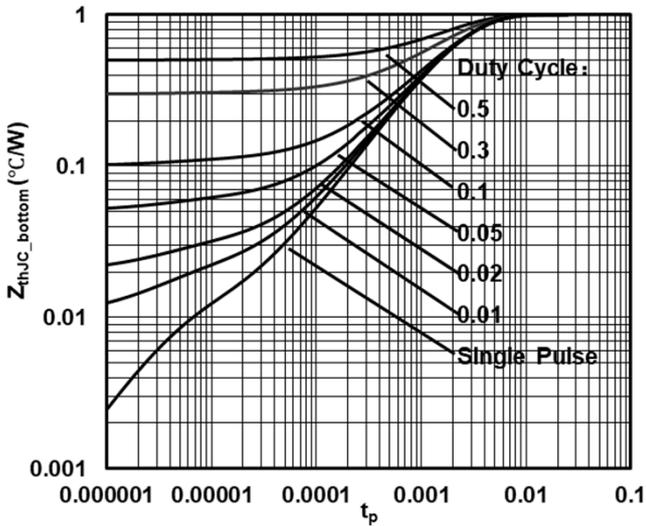
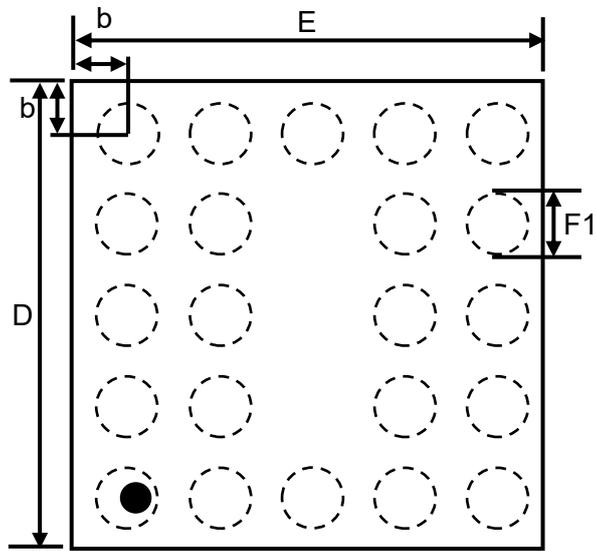


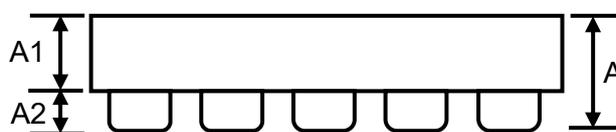
Fig.15 Max. Transient Thermal Impedance

Product Dimension (WLCSP 2.1x2.1)

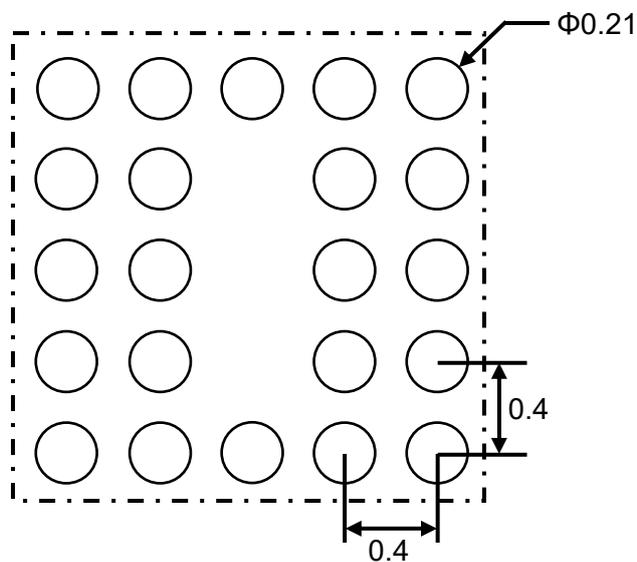


Pin1

Top View



Side View



Unit: mm

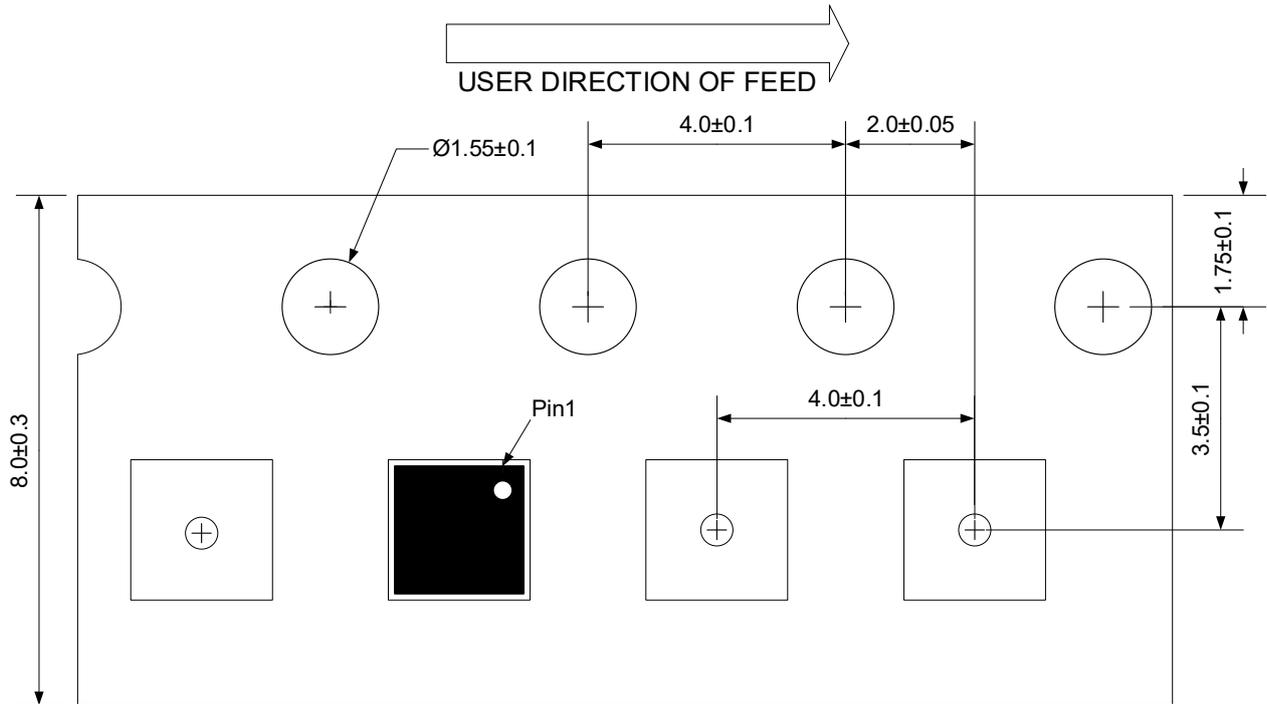
Suggested PCB Layout

Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	0.53	0.58	0.021	0.023
A1	0.34	0.36	0.013	0.014
A2	0.2 Ref.		0.008 Ref.	
D	2.075	2.125	0.082	0.084
E	2.075	2.125	0.082	0.084
b	0.26 Ref.		0.01 Ref.	
F	0.4 Ref.		0.016 Ref.	
F1	0.26 Ref.		0.01 Ref.	

Ordering Information

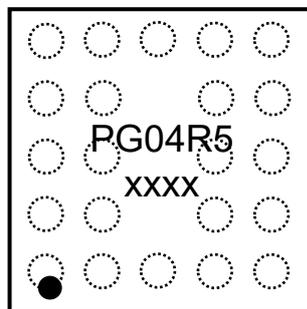
Device	Package	Reel	Shipping
PGH22BP04R5	WLCSP 2.1x2.1	7"	3000 / Tape & Reel

Load With Information



Unit:mm

Marking Information



Pin1

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