

# 60GHz mmWave Sensor

## – Fall Detection Module Pro Universal Protocol

Product categories	Function descriptions	Direction of transmission	Frame headers	Control characters	Command words	Length marking	Data	Check –sum	End of frame	Notes
System functions	Heartbeat Packet Enquiry	Issued	5359	01	01	0001	0f	sum	5443	
		Re	5359	01	01	0001	0f	sum	5443	
	Module reset	Issued	5359	01	02	0001	0f	sum	5443	
		Resport to	5359	01	02	0001	0f	sum	5443	
Proactive reporting and set-up of function points										
Product Information	Product Model Setting	Issued	5359	02	01	len	len B product information	sum	5443	
		Re	5359	02	01	len	len B product information	sum	5443	
	Product id settings	Issued	5359	02	02	len	len B product id	sum	5443	
		Re	5359	02	02	len	len B product id	sum	5443	
	Hardware model settings	Issued	5359	02	03	len	len B Hardware model	sum	5443	
		Re	5359	02	03	len	len B Hardware model	sum	5443	
	Firmware version settings	Issued	5359	02	04	len	len B firmware version	sum	5443	
		Re	5359	02	04	len	len B firmware version	sum	5443	
		Re	5359	02	05	0001	len B Protocol type	sum	5443	
	Information search									
		Issued	5359	02	A1	0001	0f	sum	5443	

	Product Model Search	Re	5359	02	A1	len	len B product information	sum	5443	
	Product id search	Issued	5359	02	A2	0001	Of	sum	5443	
		Re	5359	02	A2	len	len B product id	sum	5443	
	Hardware model search	Issued	5359	02	A3	0001	Of	sum	5443	
		Re	5359	02	A3	len	len B Hardware model	sum	5443	
	Firmware Version Search	Issued	5359	02	A4	0001	Of	sum	5443	
		Re	5359	02	A4	len	len B firmware version	sum	5443	

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OTA	Starting OTA upgrade	Issued	5359	03	01	0013	4B firmware package size + 15B solid Version number	sum	5443	
		Re	5359	03	01	0004	4B Transmission upgrade packet size per frame	sum	5443	The host computer will follow the size of the responses here Determine how long a firmware package needs to be sent down per frame
	Upgrade package transmission	Issued	5359	03	02	len+4	4B Packet offset address + len B Data packets	sum	5443	
		Re	5359	03	02	0001	01: Received successfully 02: Reception failure	sum	5443	
	Ending OTA upgrades	Issued	5359	03	03	0x0001	01: Firmware package delivery complete 02: Firmware package delivery not completed	sum	5443	
		Re	5359	03	03	0x0001	Of	sum	5443	

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	Initialization completion message	Report to	5359	05	01	0001	Of	sum	5443	
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Working condition	Radar fault upload	Report to	5359	05	02	0001	01: Radar chip anomaly 02: Encryption anomalies	sum	5443		
	Reporting of hours worked	Report to	5359	05	03	0004	4B Hours of work	sum	5443	Reporting method: One minute reporting Value range: 0–0xffffffff Units: seconds	
	Mode settings	Issued	5359	05	04	0x0001	01: Working mode 02: Standby mode 02: Test mode	sum	5443		
		Re	5359	05	04	len	01: Working mode 02: Test mode	sum	5443		
	Working hours reporting frequency setting	Report to	5359	05	06	0001	1B Frequency value	sum	5443	Value range: 0–60 Units: 1Min	
		Report to	5359	05	06	0001	1B Frequency value	sum	5443		
	Scene setting	Issued	5359	05	07	0x0001	1: Living room 2: Bedroom 3: Bathroom				
		Re	5359	05	07	0x0001	1: Living room 2: Bedroom 3: Bathroom				
	Information search										
	Initialise whether the query is complete	Issued	5359	05	81	0001	Of	sum	5443		
		Re	5359	05	81	0006	01: Completed 02: Unfinished	sum	5443		
	Hours of Work Enquiry	Issued	5359	05	83	0001	Of	sum	5443		
		Re	5359	05	83	0004	4B Hours of work	sum	5443		
	Working mode search	Issued	5359	05	84	0001	Of	sum	5443		
		Re	5359	05	84	0001	01: Working mode 02: Test mode	sum	5443		
	Test mode item search	Issued	5359	05	85	0001	Of	sum	5443		
	Working hours reporting frequency search	Issued	5359	05	86	0001	Of	sum	5443		
Re		5359	05	86	0001	1B Frequency	sum	5443			
	Issued	5359	05	87	0001	Of					

	Scene setting queries	Re	5359	05	87	0001	1B Frequency			1: Living room 2: Bedroom 3: Bathroom 4:
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Radar installation information	Mounting angle	Issued	5359	06	01	0x0006	2B X-axis angle + 2B Angle Y	sum	5443	Angle range -180° to 180° in 1° steps degrees B Z+ axis	
		Re	5359	06	01	0x0006	2B - axis degrees X-axis+ Angle 2 Angle 2B degrees Y-axis	sum	5443		
	Mounting height	Issued	5359	06	02	0002	2B Height information	sum	5443	Height in cm Step length in 1cm	
		Re	5359	06	02	0002	2B Height information	sum	5443		
	Automatic height measurement requests	Issued	5359	06	0C	0001	Of	sum	5443	Value range: 0-0xffff Unit: cm	
		Re	5359	06	0C	0002	2B Height information	sum	5443		
	Information search										
	Installation angle search	Issued	5359	06	81	0001	Of	sum	5443		
		Re	5359	06	81	0006	2B X-axis angle + 2B Y-axis Angle + 2B Z-axis angle	sum	5443		
	Installation height search	Issued	5359	06	82	0001	Of	sum	5443		
		Re	5359	06	82	0002	2B Height information	sum	5443		
	Height measurement results search	Issued	5359	06	83	0001	Of	sum	5443		
		Re	5359	06	83	0002	2B Height information	sum	5443		

Radar range Limitation information	Maximum detectable range for moving Targets leave	Issued	5359	07	01	0002	2B Distance information	sum	5443	Distances in cm Step length of 1cm
		Re	5359	07	01	0002	2B Distance information	sum	5443	

Maximum droop detectable for moving targets Straight FOV	Issued	5359	07	02	0002	2B Angle information	sum	5443	Angle range -180° to 180° Steps of 1°	
	Re	5359	07	02	0002	2B Angle information	sum	5443		
Maximum detectable Issue water for moving Targets Flat FOV	Issued	5359	07	03	0002	2B Angle information	sum	5443	Angle range -180° to 180° Steps of 1°	
	Re	5359	07	03	0002	2B Angle information	sum	5443		
Maximum detectable range for stationary targets leave	Issued	5359	07	04	0002	2B Distance information	sum	5443	Distances in cm Step length of 1cm	
	Re	5359	07	04	0002	2B Distance information	sum	5443		
Maximum detectable droop for stationary targets Straight FOV	Issued	5359	07	05	0002	2B Angle information	sum	5443	Angle range -180° to 180° Steps of 1°	
	Re	5359	07	05	0002	2B Angle information	sum	5443		
Maximum detectable water for stationary targets Flat FOV	Issued	5359	07	06	0002	2B Angle information	sum	5443	Angle range -180° to 180° Steps of 1°	
	Re	5359	07	06	0002	2B Angle information	sum	5443		
Position out of bounds status reporting	Report to	5359	07	07	0001	00: Out of range 01: Within range	sum	5443	Reporting method: When the status changes	
Information search										
Maximum detectable range for moving targets Off Search	Issued	5359	07	81	0001	Of	sum	5443		
	Re	5359	07	81	0002	2B Distance information	sum	5443		
Maximum droop detectable for moving targets Direct FOV Enquiry	Issued	5359	07	82	0001	Of	sum	5443		
	Re	5359	07	82	0002	2B Angle information	sum	5443		
Maximum detectable water for moving targets Flat FOV Search	Issued	5359	07	83	0001	Of	sum	5443		
	Re	5359	07	83	0002	2B Angle information	sum	5443		
Maximum detectable water for stationary targets off Search	Issued	5359	07	84	0001	Of	sum	5443		
	Re	5359	07	84	0002	2B Distance information	sum	5443		

	Maximum detectable droop for stationary targets Flat FOV Search	Issued	5359	07	85	0001	Of	sum	5443	
		Re	5359	07	85	0002	2B Angle information	sum	5443	
	Maximum detectable waterforstationary targets Flat FOV Search	Issued	5359	07	86	0001	Of	sum	5443	
		Re	5359	07	86	0002	2B Angle information	sum	5443	
	Position out of bounds status search	Issued	5359	07	87	0001	Of	sum	5443	
		Re	5359	07	87	0001	00: Out of range 01: Within range	sum	5443	

Human presence function on able to	Proactive reporting and set-up of function points										
	Switching the human presence function	Issued	5359	80	00	0001	01: Open 02: Off	sum	5443		
		Re	5359	80	00	0001	01: Open 02: Off	sum	5443		
	Proactive reporting of presence information	Report to	5359	80	01	0001	00: No one 01: Someone	sum	5443	Reporting method: Reported when status changes are made	
	Proactive reporting of campaign information	Report to	5359	80	02	0001	00: None 01: Stillness 02: Active	sum	5443	Reporting method: Reported when status changes are made	
	Active reporting of body movement parameters	Report to	5359	80	03	0001	1B Body movement parameters	sum	5443	Reporting method: 1s once Numerical range: 0 – 100	
	Human distance proactive reporting	Report to	5359	80	04	0002	2B Human distance	sum	5443	Reporting method: 1s once Value range: 0–65535 Units: cm	
	Active reporting of human orientation	Report to	5359	80	05	0004	6B (2B: x, 2B: y, 2B: Z) Body orientation	sum	5443	Value range: 0–360 Unit: ° The location information is positive or negative, the first 0 of the 16-bit data means positive, the first 1 means positive	
	Active reporting of movement speed	Report to	5359	80	06	0002	2B Speed of movement	sum	5443	Reporting method: 1s once Numerical range: 0–65535 Unit:cm/s	

Information search										
Human Presence Switch Enquiry	Issued	5359	80	80	0001	Of	sum	5443		
	Re	5359	80	80	0001	01: Open 02: Off	sum	5443		
Presence information search	Issued	5359	80	81	0001	Of	sum	5443		
	Re	5359	80	81	0001	00: No one 01: Someone	sum	5443		
Campaign Information Search	Issued	5359	80	82	0001	Of	sum	5443		
	Re	5359	80	82	0001	00: None 01: Stillness 02: Active	sum	5443		
Body movement parameter search	Issued	5359	80	83	0001	Of	sum	5443		
	Re	5359	80	83	0001	1B Body movement parameters	sum	5443	Numerical range: 0 – 100	
Body Distance Search	Issued	5359	80	80	0001	Of	sum	5443		
	Re	5359	80	80	0001	2B Human distance	sum	5443	Value range: 0–65535 Unit: cm	
Body orientation search	Issued	5359	80	81	0001	Of	sum	5443		
	Re	5359	80	81	0001	6B (2B: x, 2B: y, 2B: Z) Body orientation	sum	5443	Value range: 0–360 Unit: ° The location information is positive or negative, the first 0 of the 16-bit data means positive, the first 1 means positive	
Movement speed-search	Issued	5359	80	82	0001	Of	sum	5443		
	Re	5359	80	82	0001	2B Speed of movement	sum	5443	Value range: 0–65535 Unit: cm/s	
Proactive reporting and set-up of function points										
Fall monitoring function	Switch fall monitoring function	Issued	5359	83	00	0001	01: Open 02: Off	sum	5443	
	Re	5359	83	00	0001	01: Open 02: Off	sum	5443		

Falling state	Report to	0x53 0x59	83	01	0001	00: Not fallen 01: Falling	sum	5443	Reporting method: Reported when status changes are made
Confidence level for falls	Report to	0x53	83	02	0001	1B Confidence level for falls	sum	5443	Reporting method: Reported at the time of the fall
Location of the fall	Report to	0x53	83	03	0001	4B x, y information	sum	5443	Reporting method: Reported at the time of the fall
Stationary stationary state	Report to	0x53 0x59	83	05	0001	00: No stationary residency 01: With stationary residency	sum	5443	Report on status changes
Residence time setting	Issued	5359	83	0A	0001	4B hours	sum	5443	Value range: 0– 0xffffffff Unit: second
	Re	5359	83	0A	0001	4B hours	sum	5443	
Dwell switch setting	Issued	5359	83	0B	0001	1B Switch	sum	5443	0:isoff1:ison
	Re	5359	83	0B	0001	1B Switch	sum	5443	
Information search									
Enquiry about fall monitoring switches	Issued	5359	83	80	0001	Of	sum	5443	
	Re	5359	83	80	0001	01: Open 02: Off	sum	5443	
Fall Status Enquiry	Issued	5359	83	81	0001	Of	sum	5443	
	Re	5359	83	81	0001	00: Not fallen 01: Falling	sum	5443	
Fall Confidence Check	Issued	5359	83	82	0001	Of	sum	5443	
	Re	5359	83	82	len	1B Confidence level for falls	sum	5443	
	Issued	5359	83	83	0001	Of	sum	5443	



	Fall Location Search	Re	5359	83	83	0001	4B x, y information	sum	5443	
	Stationary Residence Status Enquiry	Issued	5359	83	85	0001	Of	sum	5443	
		Re	5359	83	85	0005	00: No stationary residency	sum	5443	
	Length of Stay Enquiry	Issued	5359	83	8A	0004	Of	sum	5443	
		Re	5359	83	8A	0004	4B hours	sum	5443	
	Stationary dwell switch enquiry	Issued	5359	83	8B	0001	Of	sum	5443	
		Re	5359	83	8B	0001	1B Switch	sum	5443	

Stage 1: All features with red font and a sky blue background colour are to be implemented. First edition

Stage 2: Functionality implemented for red fonts without background colour. Iterative stable version