

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
MSP430F133IPAG	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F133
MSP430F133IPAG.A	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F133
MSP430F133IPAG.B	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F133
MSP430F133IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IRTD	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IRTD.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F133IRTD.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F133
MSP430F135IPAG	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F135 REV #
MSP430F135IPAG.A	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F135 REV #
MSP430F135IPAG.B	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F135 REV #
MSP430F135IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135 REV #
MSP430F135IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135 REV #
MSP430F135IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135 REV #
MSP430F135IPMG4	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
MSP430F135IPMG4.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F135IPMG4.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F135IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135 REV #
MSP430F135IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135 REV #
MSP430F135IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F135 REV #
MSP430F135IRTD	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F135IRTD.R.A	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F135IRTD.R.B	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F135IRTD.T	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F135IRTD.T.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F135IRTD.T.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F135
MSP430F1471IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1471 REV #
MSP430F1471IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1471 REV #
MSP430F1471IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1471 REV #
MSP430F1471IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1471 REV #
MSP430F1471IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1471 REV #
MSP430F1471IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1471 REV #
MSP430F1471IRTD.T	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1471
MSP430F1471IRTD.T.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1471
MSP430F1471IRTD.T.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1471
MSP430F1471IPAG	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F147 REV #

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
MSP430F147IPAG.A	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F147 REV #
MSP430F147IPAG.B	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F147 REV #
MSP430F147IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IPMR-KAM	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IPMRG4	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F147 REV #
MSP430F147IRTDR	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F147
MSP430F147IRTDR.A	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F147
MSP430F147IRTDR.B	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F147
MSP430F147IRTD	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F147
MSP430F147IRTD.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F147
MSP430F147IRTD.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F147
MSP430F1481IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F1481IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F1481IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F1481IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F1481IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1481

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
MSP430F1481IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F1481IRTD	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F1481IRTD.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F1481IRTD.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1481
MSP430F148IPAG	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F148
MSP430F148IPAG.A	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F148
MSP430F148IPAG.B	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F148
MSP430F148IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F148 REV #
MSP430F148IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F148 REV #
MSP430F148IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F148 REV #
MSP430F148IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F148 REV #
MSP430F148IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F148 REV #
MSP430F148IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F148 REV #
MSP430F148IRTDR	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F148
MSP430F148IRTDR.A	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F148
MSP430F148IRTDR.B	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F148
MSP430F148IRTD	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F148
MSP430F148IRTD.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F148
MSP430F148IRTD.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F148
MSP430F1491IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1491

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
MSP430F1491IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IRTDR	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IRTDR.A	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IRTDR.B	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IRTD	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IRTD.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F1491IRTD.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F1491
MSP430F149CY.A	Active	Production	DIESALE (Y) 0	245 NOT REQUIRED	-	Call TI	N/A for Pkg Type	0 to 70	
MSP430F149CY.B	Active	Production	DIESALE (Y) 0	245 NOT REQUIRED	-	Call TI	N/A for Pkg Type	0 to 70	
MSP430F149IPAG	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F149 REV #
MSP430F149IPAG.A	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F149 REV #
MSP430F149IPAG.B	Active	Production	TQFP (PAG) 64	160 JEDEC TRAY (10+1)	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F149 REV #
MSP430F149IPAGR	Active	Production	TQFP (PAG) 64	1500 LARGE T&R	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F149 REV #
MSP430F149IPAGR.A	Active	Production	TQFP (PAG) 64	1500 LARGE T&R	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F149 REV #
MSP430F149IPAGR.B	Active	Production	TQFP (PAG) 64	1500 LARGE T&R	Yes	NIPDAU	Level-4-260C-72 HR	-40 to 85	M430F149 REV #
MSP430F149IPM	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (5+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #
MSP430F149IPM.A	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (5+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #
MSP430F149IPM.B	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (5+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #
MSP430F149IPMG4	Active	Production	LQFP (PM) 64	160 JEDEC TRAY (5+1)	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #
MSP430F149IPMR	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #

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MSP430F149IPMR.A	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #
MSP430F149IPMR.B	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #
MSP430F149IPMRG4	Active	Production	LQFP (PM) 64	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 85	M430F149 REV #
MSP430F149IRTD	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F149
MSP430F149IRTD.R.A	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F149
MSP430F149IRTD.R.B	Active	Production	VQFN (RTD) 64	2500 LARGE T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F149
MSP430F149IRTD	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F149
MSP430F149IRTD.T.A	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F149
MSP430F149IRTD.T.B	Active	Production	VQFN (RTD) 64	250 SMALL T&R	Yes	SN	Level-3-260C-168 HR	-40 to 85	M430F149

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative

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