

F2 Boost Power Module

NXH200B100H4F2SG, NXH200B100H4F2SG-R

The NXH200B100H4F2SG is a power module containing high-performance IGBTs with rugged anti-parallel diodes. The module also contains an on-board thermistor.

Features

- Extremely Efficient Trench with Field Stop Technology
- Low Switching Loss Reduces System Power Dissipation
- F2 Package with Solder Pins

Typical Applications

- Solar Inverter
- Uninterruptible Power Supplies

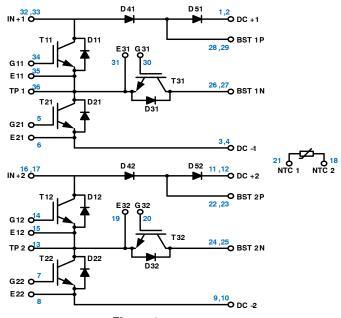
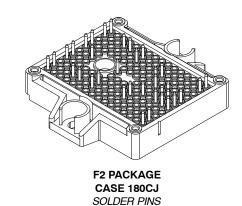
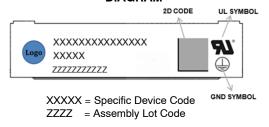


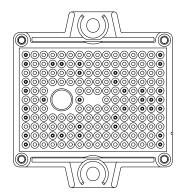
Figure 1.
NXH200B100H4F2SG/NXH200B100H4F2SG-R
Schematic Diagram



MARKING DIAGRAM



PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

Table 1. ABSOLUTE MAXIMUM RATINGS (Note 1) $T_J = 25^{\circ}C$ unless otherwise noted

Rating	Symbol	Value	Unit
BOOST IGBT (T11, T21, T12, T22)			
Collector-Emitter Voltage	V _{CES}	1000	V
Gate-Emitter Voltage	V_{GE}	±20	V
Continuous Collector Current @ T _h = 80°C	I _C	100	А
Pulsed Collector Current	I _{Cpulse}	300	А
Maximum Power Dissipation @ T _h = 80°C	P _{tot}	93	W
Minimum Operating Junction Temperature	T _{JMIN}	-40	°C
Maximum Operating Junction Temperature	T _{JMAX}	150	°C
BOOST IGBT INVERSE DIODE (D11, D21, D12, D22)			
Peak Repetitive Reverse Voltage	V_{RRM}	1600	V
Continuous Forward Current @ T _h = 80°C	I _F	30	Α
Repetitive Peak Forward Current, Tpulse = 1 ms	I _{FRM}	90	Α
Power Dissipation Per Diode @ T _h = 80°C	P _{tot}	37	W
Minimum Operating Junction Temperature	T _{JMIN}	-40	°C
Maximum Operating Junction Temperature	T _{JMAX}	150	°C
PATH IGBT (T31, T32)			
Collector-Emitter Voltage	V _{CES}	1000	V
Gate-Emitter Voltage	V _{GE}	±20	V
Continuous Collector Current @ T _h = 80°C	I _C	100	Α
Pulsed Collector Current	I _{Cpulse}	300	А
Maximum Power Dissipation @ T _h = 80°C	P _{tot}	109	W
Minimum Operating Junction Temperature	T _{JMIN}	-40	°C
Maximum Operating Junction Temperature	T _{JMAX}	150	°C
PATH IGBT INVERSE DIODE (D31, D32)			
Peak Repetitive Reverse Voltage	V_{RRM}	1200	V
Continuous Forward Current @ T _h = 80°C	I _F	40	Α
Repetitive Peak Forward Current	I _{FRM}	120	Α
Power Dissipation Per Diode @ T _h = 80°C	P _{tot}	78	W
Minimum Operating Junction Temperature	T _{JMIN}	-40	°C
Maximum Operating Junction Temperature	T _{JMAX}	150	°C
BOOST DIODE (D41, D51, D42, D52)			
Peak Repetitive Reverse Voltage	V _{RRM}	1200	V
Continuous Forward Current @ T _h = 80°C	I _F	40	А
Repetitive Peak Forward Current, Tpulse = 1 ms	I _{FRM}	120	А
Maximum Power Dissipation @ $T_h = 80^{\circ}C$	P _{tot}	72	W
Minimum Operating Junction Temperature	T _{JMIN}	-40	°C
Maximum Operating Junction Temperature	T _{JMAX}	150	°C
THERMAL PROPERTIES			
Storage Temperature range	T _{stg}	-40 to 125	°C
INSULATION PROPERTIES			
Isolation test voltage, t = 1 sec, 50 Hz	V _{is}	3000	V_{RMS}
Creepage distance (pin to heatsink)		>12.7	mm

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Refer to ELECTRICAL CHARACTERISTICS, RECOMMENDED OPERATING RANGES and/or APPLICATION INFORMATION for Safe

Operating parameters.

Table 2. RECOMMENDED OPERATING RANGES

Rating	Symbol	Min	Max	Unit
Module Operating Junction Temperature	T_J	-40	150	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Table 3. ELECTRICAL CHARACTERISTICS $T_J = 25^{\circ}C$ unless otherwise noted

Parameter	Test Conditions	Symbol	Min	Тур	Max	Unit	
BOOST IGBT CHARACTERISTICS (T11, T21, T12, T22)							
Collector–Emitter Cutoff Current V _{GE} = 0 V, V _{CE} = 1000 V		I _{CES}	_	_	200	μΑ	
Collector-Emitter Saturation Voltage	V _{GE} = 15 V, I _C = 100 A, T _J = 25°C	V _{CE(sat)}	_	1.8	2.4	٧	
	V _{GE} = 15 V, I _C = 100 A, T _J = 150°C		-	2.1	-		
Gate-Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 100 mA	V _{GE(TH)}	3.9	5	6.3	V	
Gate Leakage Current	V _{GE} = 20 V, V _{CE} = 0 V	I _{GES}	-	-	800	nA	
Turn-on Switching Loss per Pulse	$T_J = 25^{\circ}C$ $V_{CE} = 600 \text{ V, } I_C = 30 \text{ A}$	E _{on}	_	0.57	-	mJ	
Turn-off Switching Loss per Pulse	$V_{GE} = 600 \text{ V}, I_{C} = 30 \text{ A}$ $V_{GE} = -5 \text{ V} \sim 15 \text{ V}, R_{G} = 10 \Omega$	E _{off}	=	0.96	=		
Turn-on Switching Loss per Pulse	T _J = 125°C	E _{on}	-	0.70	-	mJ	
Turn-off Switching Loss per Pulse	$V_{CE} = 600 \text{ V}, I_{C} = 30 \text{ A}$ $V_{GE} = -5 \text{ V} \sim 15 \text{ V}, R_{G} = 10 \Omega$	E _{off}	=	1.60	-		
Input Capacitance	V _{CE} = 20 V, V _{GE} = 0 V, f = 1 MHz	C _{ies}	-	6523	-	pF	
Output Capacitance		C _{oes}	-	253	-	-	
Reverse Transfer Capacitance		C _{res}	-	26	-	-	
Total Gate Charge	$V_{CE} = 600 \text{ V}, I_{C} = 100 \text{ A}, V_{GE} = \pm 15 \text{ V}$	Qg	=	326	-	nC	
Thermal Resistance - chip-to-case		R _{thJC}	=	0.42	=	°C/W	
Thermal Resistance – chip-to-heatsink	Thermal grease, Thickness \approx 57 $\mu m,$ λ = 2.87 W/mK	R _{thJH}	_	0.75	-	°C/W	
BOOST IGBT INVERSE DIODE CHARAC	TERISTICS (D11, D21, D12, D22)					•	
Diode Forward Voltage	I _F = 30 A, T _J = 25°C	V _F	=	1	1.6	V	
	I _F = 30 A, T _J = 150°C		_	0.94	-		
Thermal Resistance - chip-to-case		R _{thJC}	_	0.77	-	°C/W	
Thermal Resistance - chip-to-heatsink	Thermal grease, Thickness \approx 57 $\mu m,$ λ = 2.87 W/mK	R _{thJH}	_	1.19	-	°C/W	
PATH IGBT CHARACTERISTICS (T31, T	32)					•	
Collector-Emitter Cutoff Current	$V_{GE} = 0 \text{ V}, V_{CE} = 1000 \text{ V}$	I _{CES}	-	_	200	μΑ	
Collector-Emitter Saturation Voltage	V _{GE} = 15 V, I _C = 100 A, T _J = 25°C	V _{CE(sat)}	-	1.26	2.1	V	
	V _{GE} = 15 V, I _C = 100 A, T _J = 150°C		_	1.34	-		
Gate-Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 100 mA	V _{GE(TH)}	3.2	4.6	5.5	V	
Gate Leakage Current	V _{GE} = 20 V, V _{CE} = 0 V	I _{GES}	=	_	800	nA	
Input Capacitance	V _{CE} = 20 V, V _{GE} = 0 V, f = 1 MHz	C _{ies}	=	20937	=	pF	
Output Capacitance	7	C _{oes}	_	341	-		
Reverse Transfer Capacitance	1	C _{res}	_	158	-	1	
Total Gate Charge	$V_{CE} = 600 \text{ V}, I_{C} = 100 \text{ A}, V_{GE} = 15 \text{ V}$	Qg	_	1746	-	nC	
Thermal Resistance - chip-to-case		R _{thJC}	_	0.33	-	°C/W	
Thermal Resistance – chip-to-heatsink	Thermal grease, Thickness $\approx 57~\mu m,$ $\lambda = 2.87~W/mK$	R _{thJH}	=	0.64	=	°C/W	

Table 3. ELECTRICAL CHARACTERISTICS T_{.1} = 25°C unless otherwise noted

Parameter	Test Conditions	Symbol	Min	Тур	Max	Unit
PATH IGBT INVERSE DIODE CHARACTE	ERISTICS (D31, D32)		•		•	
Diode Forward Voltage	I _F = 40 A, T _J = 25°C	V_{F}	_	2.3	3	V
	I _F = 40 A, T _J = 150°C		_	1.6	_	
Thermal Resistance - chip-to-case		RthJC	_	0.6	_	°C/W
Thermal Resistance - chip-to-heatsink	Thermal grease, Thickness \approx 57 μ m, λ = 2.87 W/mK	RthJH	-	0.9	-	°C/W
BOOST DIODE CHARACTERISTICS (D4	1, D51, D42, D52)					
Diode Reverse Leakage Current	V _R = 1200 V, T _J = 25°C	I _R	-	_	400	μΑ
Diode Forward Voltage	I _F = 40 A, T _J = 25°C	V_{F}	_	1.5	2	V
	I _F = 40 A, T _J = 150°C		_	2.0	_	
Peak Reverse Recovery Current	T _J = 25°C	I _{RRM}	-	10	-	Α
Reverse Recovery Energy	V_{CE} = 600 V, I_{C} = 30 A V_{GE} = -5 V ~ 15V, R_{G} = 10 Ω	E _{rr}	_	66	_	μJ
Peak Reverse Recovery Current	T _J = 125°C	I _{RRM}	_	9.9	_	Α
Reverse Recovery Energy	V_{CE} = 600 V, I_{C} = 30 A V_{GE} = -5 V ~ 15V, R_{G} = 10 Ω	E _{rr}	_	64	_	μJ
Thermal Resistance - chip-to-case		R _{thJC}	=	0.59	=	°C/W
Thermal Resistance – chip-to-heatsink	Thermal grease, Thickness \approx 57 μ m, λ = 2.87 W/mK	R _{thJH}	-	0.97	-	°C/W

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Table 4. THERMISTOR CHARACTERISTICS

Parameter	Test Conditions	Symbol	Min	Тур	Max	Unit
Nominal resistance		R ₂₅	-	22	-	kΩ
Nominal resistance	T = 100°C	R ₁₀₀	-	1486	-	Ω
Deviation of R25		-R/R	-5	-	5	%
Power dissipation		P_{D}	-	200	-	mW
Power dissipation constant			-	2	-	mW/K
B-value	B(25/50), tolerance ±3%		-	3950	-	K
B-value	B(25/100), tolerance ±3%		-	3998	_	K

Table 5. ORDERING INFORMATION

Orderable Part Number	Marking	Package	Shipping
NXH200B100H4F2SG,	NXH200B100H4F2SG,	F2 - Case 180CJ	20 Units / Blister Tray
NXH200B100H4F2SG-R	NXH200B100H4F2SG-R	(Pb-Free and Halide-Free, Solder Pins)	

TYPICAL CHARACTERISTICS - BOOST IGBT & INVERSE DIODE

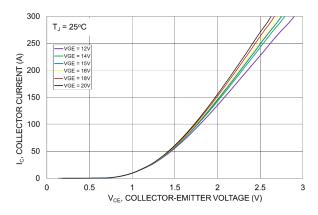


Figure 2. Typical Output Characteristics

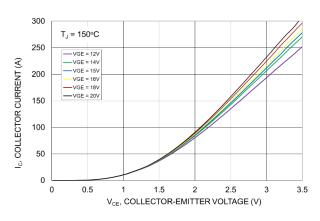


Figure 3. Typical Output Characteristics

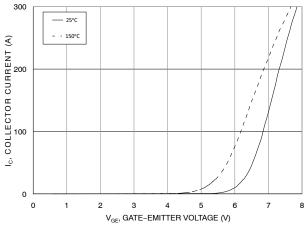


Figure 4. Typical Transfer Characteristics

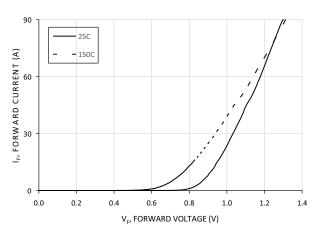


Figure 5. Inverse Diode Forward Characteristics

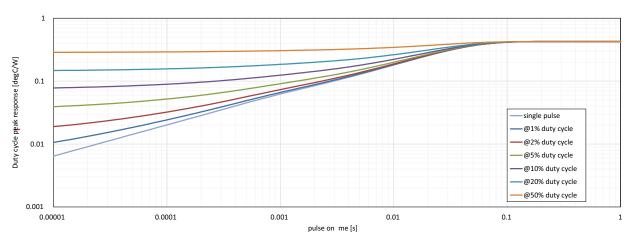


Figure 6. Boost IGBT Transient Thermal Impedance

TYPICAL CHARACTERISTICS - BOOST IGBT & INVERSE DIODE

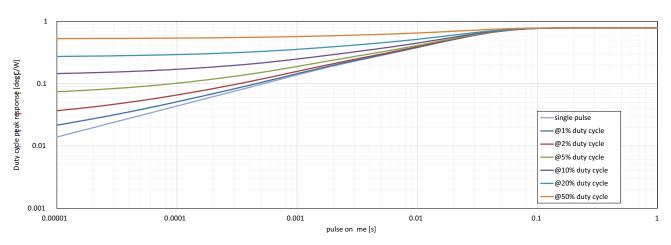


Figure 7. Inverse Diode Transient Thermal Impedance

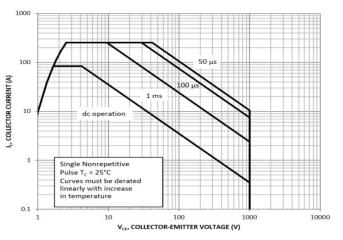


Figure 8. Boost IGBT FBSOA

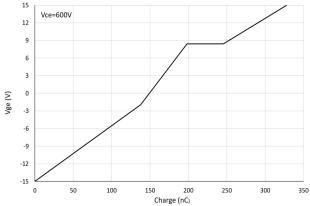


Figure 9. Boost IGBT Gate Voltage vs. Gate Charge

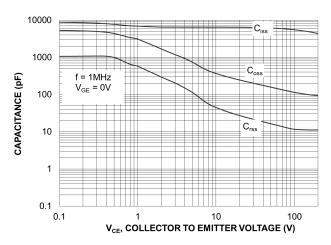


Figure 10. Boost IGBT Capacitance

TYPICAL CHARACTERISTICS - PATH IGBT & INVERSE DIODE

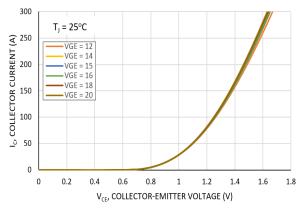


Figure 11. Typical Output Characteristics

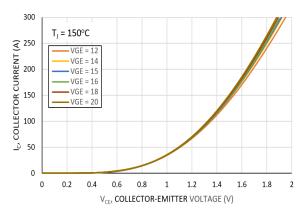


Figure 12. Typical Output Characteristics

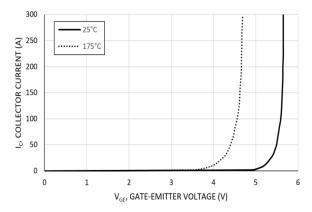


Figure 13. Typical Transfer Characteristics

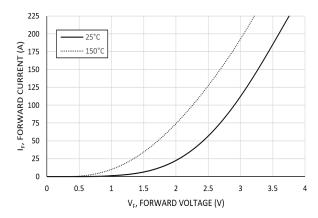


Figure 14. Inverse Diode Forward Characteristics

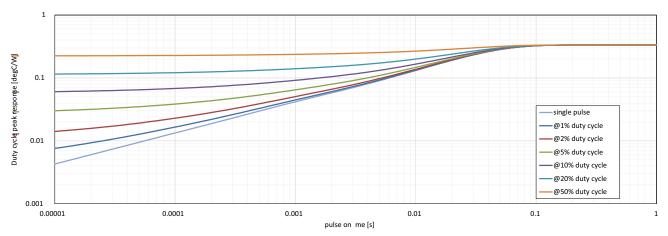


Figure 15. Path IGBT Transient Thermal Impedance

TYPICAL CHARACTERISTICS - PATH IGBT & INVERSE DIODE

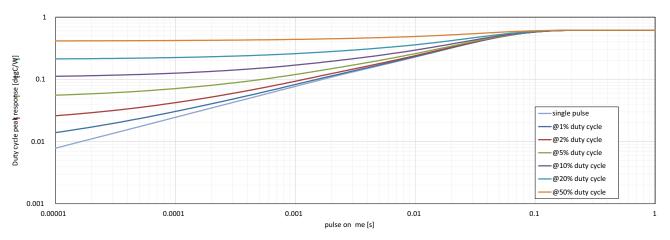


Figure 16. Inverse Diode Transient Thermal Impedance

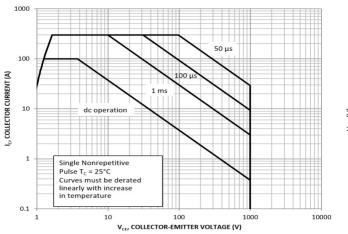


Figure 17. Path IGBT FBSOA

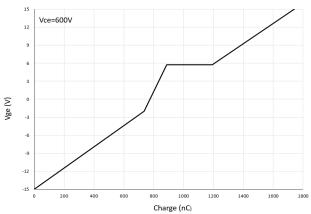


Figure 18. Path IGBT Gate Voltage vs. Gate Charge

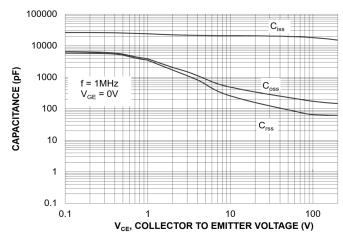


Figure 19. Path IGBT Capacitance

TYPICAL CHARACTERISTICS - BOOST DIODE

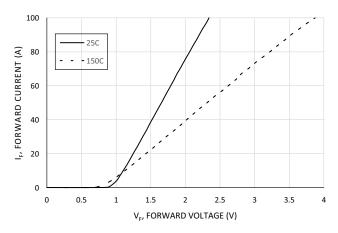


Figure 20. Typical Forward Characteristics

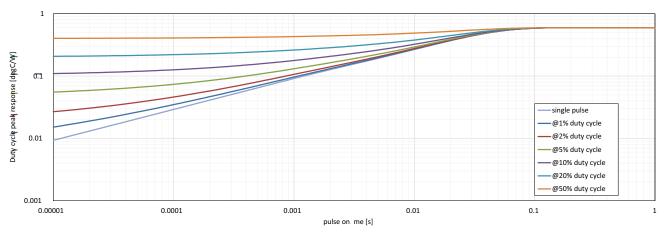
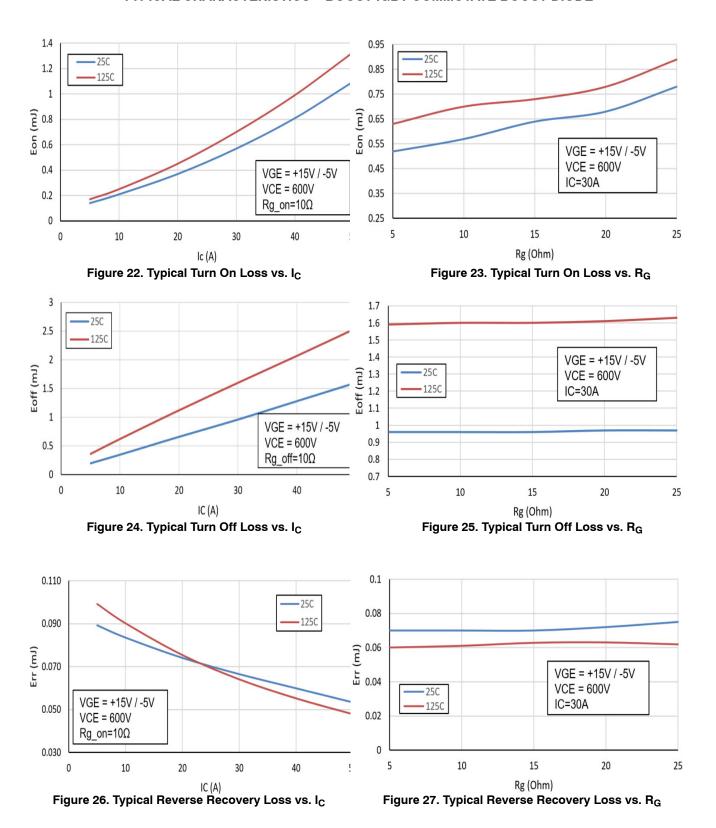


Figure 21. Junction-to-Case Transient Thermal Impedance

TYPICAL CHARACTERISTICS - BOOST IGBT COMMUTATE BOOST DIODE



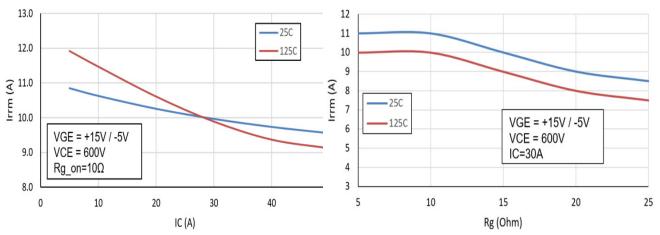


Figure 28. Typical Reverse Recovery Current vs. I_C

Figure 29. Typical Reverse Recovery Current vs. $\rm R_{\rm G}$

TYPICAL CHARACTERISTICS - THERMISTOR

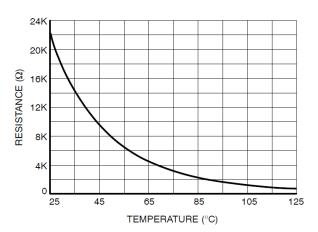


Figure 30. Thermistor Characteristics



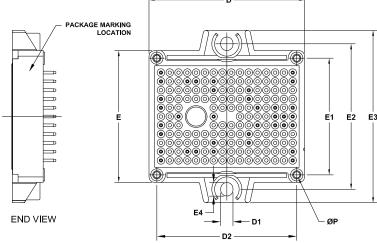


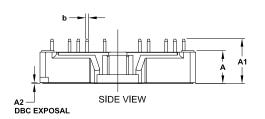
PIM36 56.7x42.5 (SOLDER PIN)

CASE 180CJ ISSUE C

DATE 18 MAY 2023





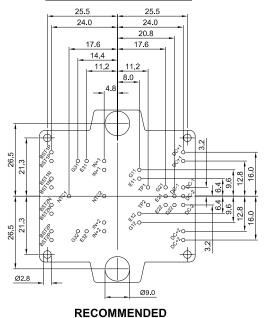


TOP VIEW

NOTES:

- 1. CONTROLLING DIMENSION: MILLIMETERS
- 2. PIN POSITION TOLERANCE IS ± 0.4mm

	MILLIMETERS				
DIM	MIN.	NOM.	MAX.		
Α	11.65	12.00	12.35		
A1	15.65	16.15	16.65		
A2	0.00	0.35	0.60		
b	0.95	1.00	1.05		
D	56.40	56.70	57.00		
D1	4.40	4.50	4.60		
D2	50.85	51.00	51.15		
Е	47.70	48.00	48.30		
E1	42.35	42.50	42.65		
E2	52.90	53.00	53.10		
E3	62.30	62.80	63.30		
E4	4.90	5.00	5.10		
Р	2,20	2.30	2.40		



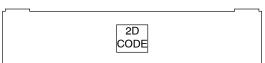
MOUNTING PATTERN

* For additional Information on our Pb—Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDER

GENERIC MARKING DIAGRAM*

XXXXXXXXXXXXXXX	XXXXXXXXX	
XXXXXXXXXXXXXXX	XX	
ZZZZZZZZZZZ	ATYYWW	

FRONTSIDE MARKING



BACKSIDE MARKING

XXXXX = Specific Device Code

ZZZZ = Assembly Lot Code

= Assembly & Test Site Code

YYWW = Year and Work Week Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " • ", may or may not be present. Some products may not follow the Generic Marking.

RM/D.

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DESCRIPTION:	PIM36 56.7x42.5 (SOLDER PIN)		PAGE 1 OF 1

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