CXT-PLA3BG07820RA DATASHEET

Version: 1.2
2-Oct-25
(Last Modification Date)

750V/820A 3-Phase IGBT Power Module

General description

CXT-PLA3BG07820RA is a 750V/820A 3-Phase IGBT Power Module based on Trench Gate Field Stop (TG-FS) technology made and qualified for the most stringent automotive applications. The product offers fast switching, short tail currents and easy paralleling. It also features a freewheeling diode with fast and soft reverse recovery.

The innovative heatsink features a dense and ellipsoid pin fin grid, providing improved thermal performance and reduced flow resistance, significantly boosting the cooling capacity of the module. The power module is AQG-324 automotive qualified and guaranteed to operate over the full -40°C to +175°C (Tj) temperature range.

Applications

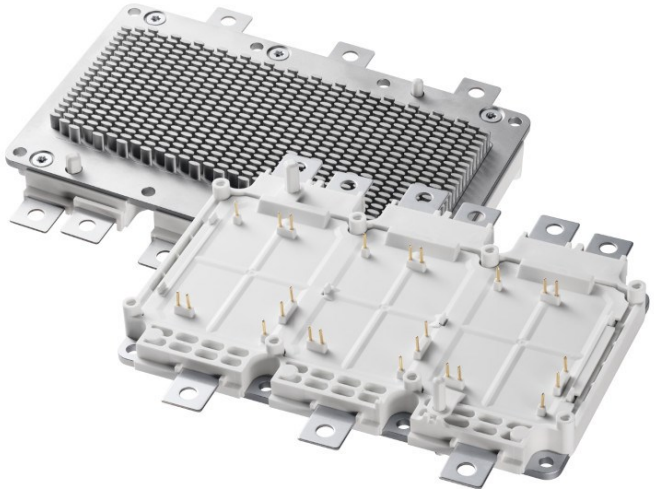
- Traction inverters
- Auxiliary inverters
- Automotive, E-Mobility, e-Trucks, Off-Road Vehicles, Agriculture, e-Boats

Features

- Specified from -40 to +175°C (Tj)
- Max Collector Voltage: 750V
- Implemented Collector Current: 820A
- Low Saturation Voltage
  - $V_{CE(sat)}$= 1.15V @ I_C=450A, Tj=25°C
  - $V_{CE(sat)}$= 1.25V @ I_C=450A, Tj=175°C
- Low Switching Energy
  - Eon= 16.8mJ at Tj=25°C
  - Eoff= 15.7mJ at Tj=25°C
- Gate charge: Q_G=1.2µC
- Package: CPAK-HPC

Benefits

- Trench Gate Field Stop technology
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Direct Liquid Cooled Pin Fin Base Plate
- Embedded NTC temperature sensor



Absolute Maximum Ratings

IGBT

Parameter	Symbol	Condition	Value	Unit
Collector Emitter Voltage	V_{CES}	T_j=25°C	750	V
Gate Emitter Voltage	V_{GES}		+/-20	V
Implemented Collector Current	I_{CN}		820	A
DC Collector Current	I_C	T_F=80°C, T_{jmax}=175°C	450	A
Repetitive Peak Collector Current	I_{CM}	Tp=1ms	1640	A
Power Dissipation per IGBT	P_{TOT}	T_F=25°C, T_{jmax}=175°C	1154	W
Junction Temperature	Tjmax		175	°C

Diode

Parameter	Symbol	Condition	Value	Unit
Repetitive Reverse Voltage	V_{RSM}	T_j=25°C	750	V
Implemented Forward Current	I_F		100	A
Average Forward Current	$I_{F(AVG)}$		450	A
Repetitive Peak Forward Current	I_{FRM}	Tp=1ms	1640	A
I^2t - value	I^2t	Tj =150°C, t=10ms, V_R=0V	31.25	kA^2s
Junction Temperature	Tjmax		175	°C

THERMAL RESISTANCE

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Junction-to-fluid thermal resistance	R_{thJF}	IGBT: Junction to cooling fluid, △V/△t = 10 dm^3/min, T_F = 25°C（Per IGBT）			0.13	°C/W
Junction-to-fluid thermal resistance	R_{thJFD}	Diode : Junction to cooling fluid, △V/△t = 10 dm^3/min, T_F = 25°C（Per Diode）			0.19	

IGBT Electrical characteristics

Unless otherwise stated, T_j =25°C.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V_{CE} =V_{GE}, I_C=9.6mA	4.6	5.4	6.2	V
Collector Emitter Saturation Voltage	$V_{CE(Sat)}$	I_C =450A, V_{GE}=15V, T_j=25°C		1.15		V
		I_C =450A, V_{GE}=15V, T_j=150°C		1.25		
		I_C =450A, V_{GE}=15V, T_j=175°C		1.25		
		I_C =820A, V_{GE}=15V, T_j=25°C		1.35		
		I_C =820A, V_{GE}=15V, T_j=150°C		1.55		
		I_C =820A, V_{GE}=15V, T_j=175°C		1.6		
Collector Leakage Current	I_{CES}	V_{CE} =750V, V_{GE}=0V, T_j=25°C			1	mA
		V_{CE} =750V, V_{GE}=0V, T_j=150°C			5	
		V_{CE} =750V, V_{GE}=0V, T_j=175°C		4.5	5	
Gate Leakage Current	I_{GES}	V_{CE} =0V, V_{GE}=+/-20V, T_j=25°C	-400		400	nA
Integrated Gate Resistor	R_{gint}			1.4		Ω
Gate Charge	Q_G	V_{CE} =400V, I_C=450A,		1.2		µC
Input Capacitance	C_{IES}	V_{CE} =25V, V_{GE} =0V, f = 1 MHz		33.5		nF
Output Capacitance	C_{OES}			3.2		
Reverse Transfer Capacitance	C_{RES}			0.63		
Input Capacitance	C_{IES}	V_{CE} =50V, V_{GE} =0V, f = 1 MHz		33.2		nF
Output Capacitance	C_{OES}			2.3		
Reverse Transfer Capacitance	C_{RES}			0.46		
Turn-on delay time	$T_{d(ON)}$	V_{CC}=400V; V_{GE}= +/-15V; I_C = 450A; R_G= 2.7Ω; Inductive load		98		ns
				104		
Rise time	T_r			58		
				62		
Turn-off delay time	$T_{d(OFF)}$			480		
				540		
Fall time	T_f			70		
				130		
Turn-On Switching Energy	E_{on}			16.8		mJ
				21.1		
Turn-Off Switching Energy	E_{off}			15.7		
				25		
Short Circuit Current	I_{SC}	tpsc≤3µs , V_{GE}=15V T_J=150℃,V_{CC}=400V		4500		A
Operating Junction temperature	T_{jop}		-40		150	°C

Anti-Parallel Diode Electrical Characteristics

Unless otherwise stated, T_j =25°C.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F=450A; V_{GE}=0V; T_j=25°C;		1.27	1.53	V
		I_F=450A; V_{GE}=0V; T_j=150°C;		1.29		
		I_F=450A; V_{GE}=0V; T_j=175°C;		1.29		
		I_F=820A; V_{GE}=0V; T_j=25°C;		1.50		
		I_F=820A; V_{GE}=0V; T_j=150°C;		1.64		
		I_F=820A; V_{GE}=0V; T_j=175°C;		1.70		
Reverse Recovery Time	T_{rr}	I_F=450A; V_R=400V; dI_F/dt = -6900A/µS; T_j=150°C;		230		ns
Peak Reverse Recovery Current	I_{RRM}			460		A
Reverse Recovery Charge	Q_{RR}			63.4		µC
Reverse Recovery Energy	E_{rec}			20.6		mJ
Operating Junction temperature	T_{jop}		-40		150	°C

NTC Characteristics

Unless otherwise stated, T_{NTC} =25°C.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Resistance	R_{25}	T_{NTC}=25°C		5		kΩ
B Value	$B_{25/50}$	$R_{NTC}(T) = R_{25} \exp [B_{25/50}(1/T - 1/(298.15\ K))]$		3375		K

Module Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Storage Temperature	T_{st}		-40		125	°C
Isolation Breakdown Voltage	V_{isol}	RMS, f = 0 Hz, t = 1 sec		4.2		kV
Comparative Tracking Index	CTI		200			
Creepage distance	d_{Creep}	Terminal to heatsink		9		mm
		Terminal to terminal		9		mm
Clearance	d_{Clear}	Terminal to heatsink		4.5		Mm
		Terminal to terminal		4.5		mm
Mounting Torque		Baseplate to heatsink (M3 recommended)	1.8		2.2	Nm
		PCB to frame	0.65		0.75	Nm
Weight				775		g

Typical Performance Characteristics

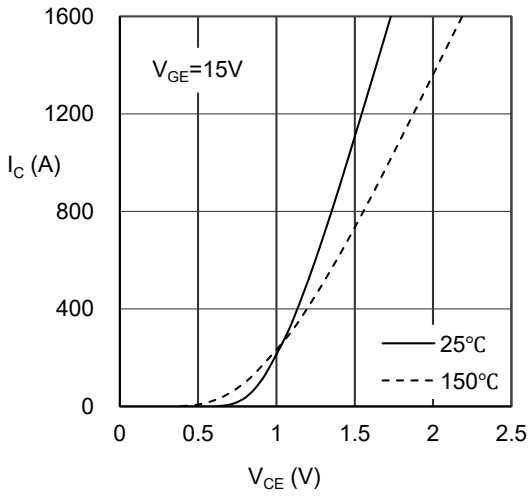


Figure 1: Typical Output Characteristics

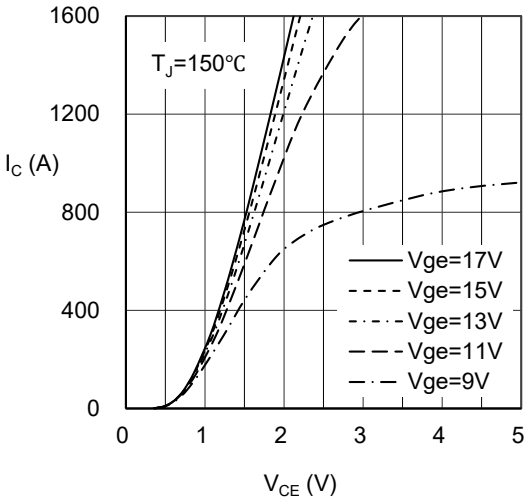


Figure 2: Typical Output Characteristics

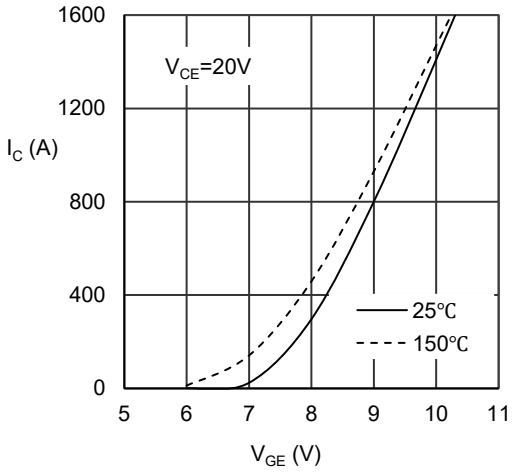


Figure 3: Typical Transfer characteristics

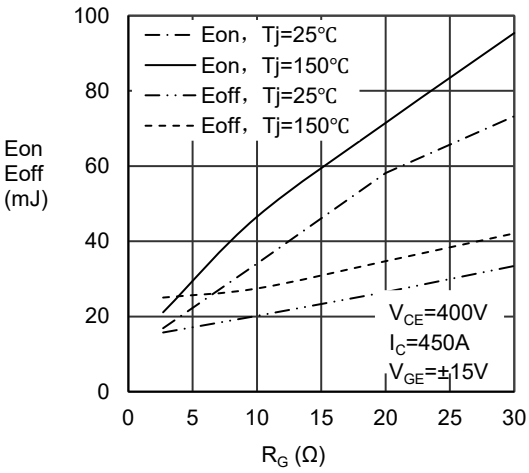


Figure 4: Switching energies vs R_G

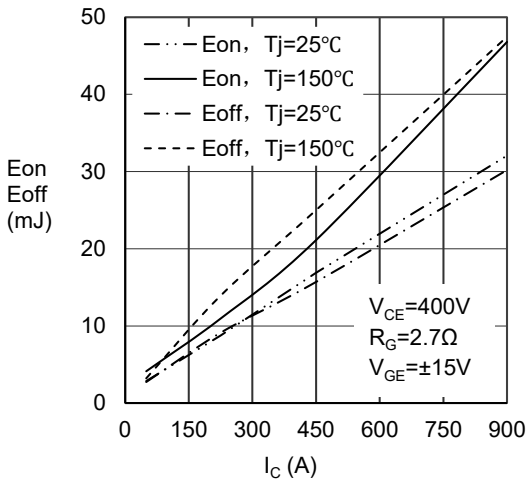


Figure 5: Switching energies vs Collector Current

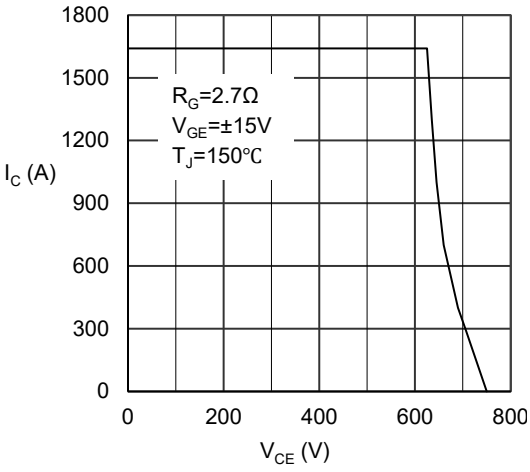


Figure 6: Reverse Bias Safe Operating Area

Typical Performance Characteristics (cnt'd)

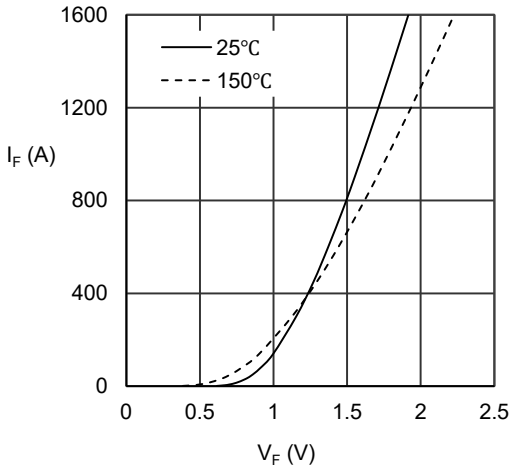


Figure 7: Diode Forward Characteristics

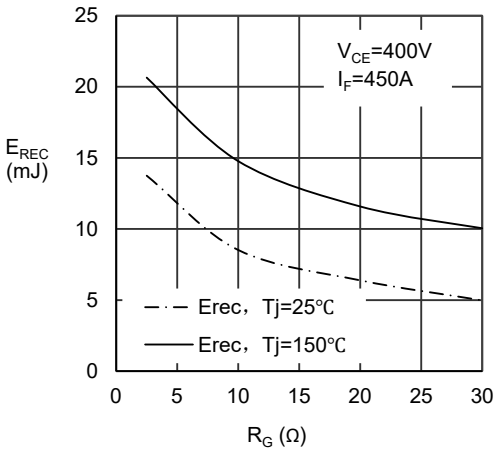


Figure 8: Switching Energy vs Gate Resistor

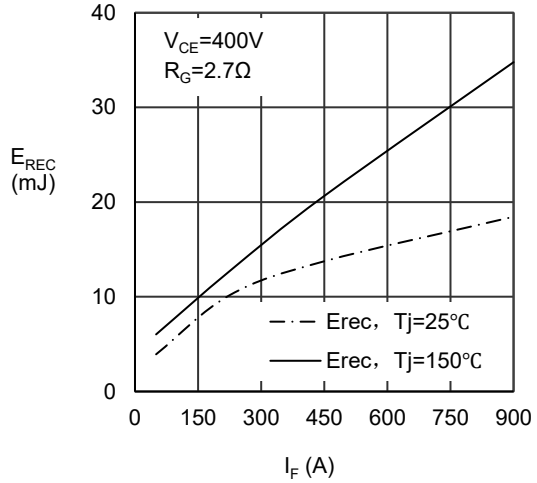


Figure 9: Switching Energy vs Forward Current

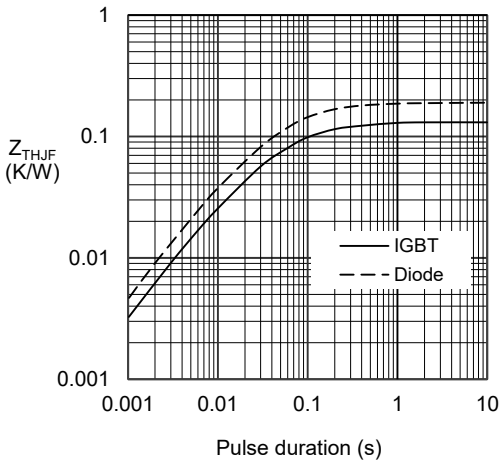


Figure 10: Transient Thermal Impedance

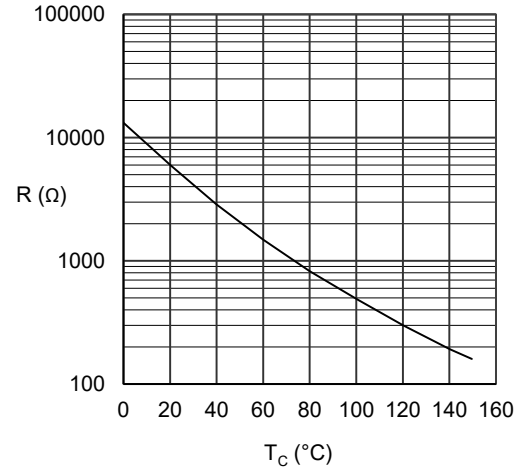
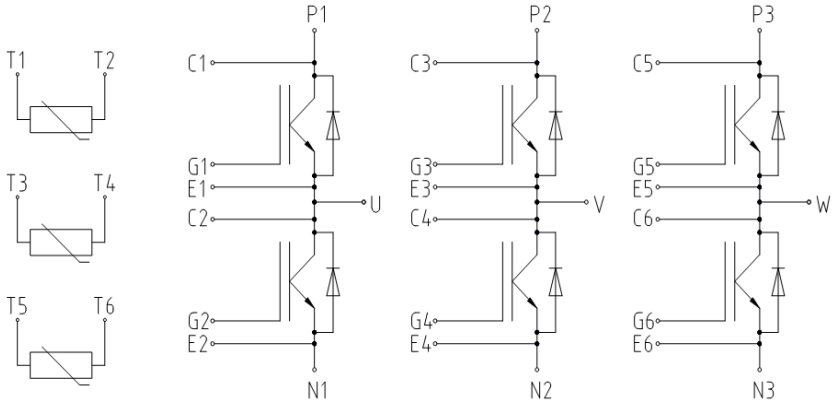
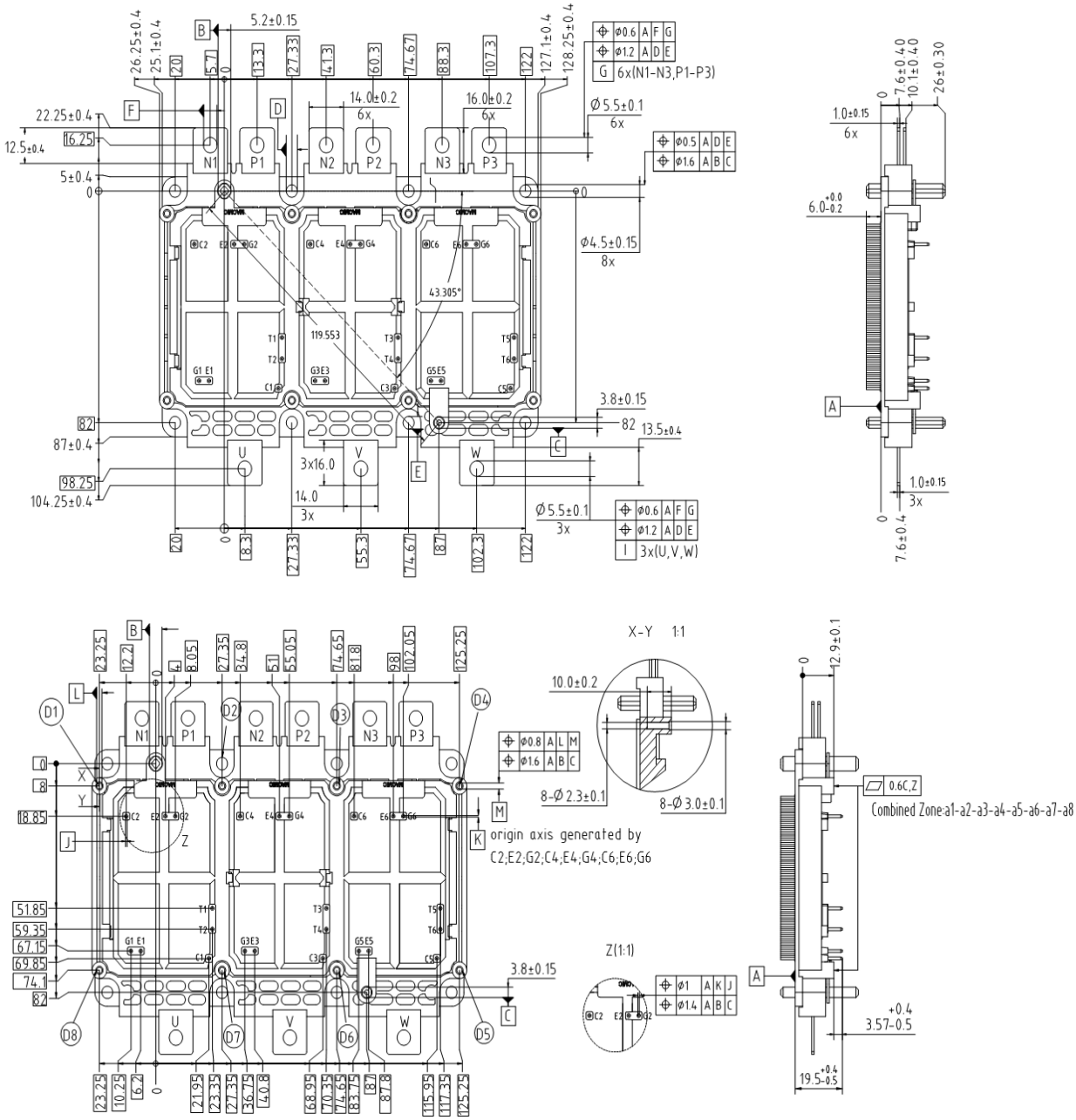


Figure 11: NTC Characteristics

Package Configuration



Package Dimensions (in mm)



Ordering Information

Product Name	Ordering Reference	Package	Marking
CXT-PLA3BG07820RA	CXT-PLA3BG07820RA	CPAK-HPC	CXT-PLA3BG07820RA

Contact & Ordering

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