

CMT-PLA0BN06075MA DATASHEET

Version: 1.1
3-Oct-25
(Last Modification
Date)

650V/75A IGBT in Trench TGFS Technology (Low Conduction Losses)

General description

CMT-PLA0BN06075MA is a 650V/75A IGBT with Low Saturation Voltage, and hence Low Conduction Losses, in Trench Gate Field Stop (TGFS) technology. The product offers fast switching and short tail current. It also features a free wheeling diode with fast and soft reverse recovery. It is available in a TO-247-3L package, and guaranteed for normal operation over the full temperature range from -40 to +175°C (Tj).

Benefits

- Trench Gate Field Stop Technology
- Low Saturation Voltage
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery

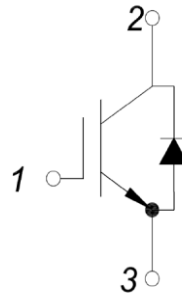
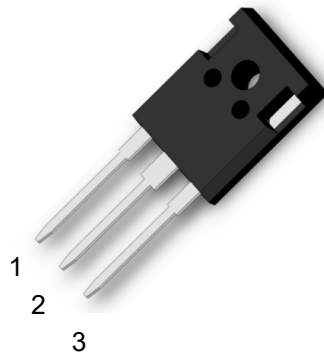
Features

- Specified from -40 to +175°C (Tj)
- V_{CES} Max: 650V
- I_C Max Collector Current
 - 115A at $T_C=25^\circ\text{C}$
 - 75A at $T_C=100^\circ\text{C}$
- Low Saturation Voltage
 - $V_{CE(sat)} = 1.45\text{V}$ @ $I_C=75\text{A}$, $T_j=25^\circ\text{C}$
 - $V_{CE(sat)} = 1.65\text{V}$ @ $I_C=75\text{A}$, $T_j=125^\circ\text{C}$
- Switching Energy
 - $E_{on} = 2.35\text{mJ}$ at $T_j=25^\circ\text{C}$
 - $E_{off} = 2.36\text{mJ}$ $T_j=25^\circ\text{C}$
- Gate charge: $Q_G=360\text{nC}$
- Package: TO-247-3L

Applications

- Motor control
- UPS/PFC
- General purpose inverters

Package Configuration



TO-247-3L (Pin 1= Gate; Pin 2= Collector; Pin 3= Emitter)

Absolute Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector Emitter Voltage	V_{CES}	$T_J=25^{\circ}\text{C}$	650	V
Gate Emitter Voltage	V_{GES}		+/-20	V
		Transient ($T_p \leq 10\mu\text{s}$, $D < 0.01$)	+/-30	V
DC Collector Current	I_C	$T_C=25^{\circ}\text{C}$	115	A
		$T_C=100^{\circ}\text{C}$	75	A
Pulsed Collector Current	I_{Cpulse}	T_p limited by T_{Jmax}	225	A
Power Dissipation per IGBT	P_{TOT}		535	W
Repetitive Reverse Voltage	V_{RSM}	$T_J=25^{\circ}\text{C}$	650	V
Forward Current	I_F	$T_C=25^{\circ}\text{C}$	100	A
		$T_C=100^{\circ}\text{C}$	75	A
Diode Pulsed Current	I_{Fpulse}	T_p limited by T_{Jmax}	225	A
Maximum Junction Temperature	T_{Jmax}		175	$^{\circ}\text{C}$
Operating Temperature	T_{Jop}		-40 to 175	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-55 to 150	$^{\circ}\text{C}$
Wave Soldering Temperature	T_{SLD}	1.6mm from case for 10s	260	$^{\circ}\text{C}$
Maximum Mounting Torque	M	M3 screw	1.1	Nm
Weight	m		8	g

THERMAL RESISTANCE ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Junction-to-case thermal resistance	R_{thJC}	IGBT			0.24	$^{\circ}\text{C/W}$
Junction-to-case thermal resistance	R_{thJCD}	Diode			0.48	
Junction-to-ambient thermal resistance	R_{thJA}				40	

IGBT Electrical characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{CE} = V_{GE}$, $I_C = 3.0\text{mA}$	4.8	5.6	6.5	V
Collector Emitter Saturation Voltage	$V_{CE(Sat)}$	$I_C = 75\text{A}$, $V_{GE} = 15\text{V}$, $T_J = 25^\circ\text{C}$		1.45	1.95	V
		$I_C = 75\text{A}$, $V_{GE} = 15\text{V}$, $T_J = 125^\circ\text{C}$		1.65		
		$I_C = 75\text{A}$, $V_{GE} = 15\text{V}$, $T_J = 150^\circ\text{C}$		1.7		
Collector Leakage Current	I_{CES}	$V_{CE} = 650\text{V}$, $V_{GE} = 0\text{V}$, $T_J = 25^\circ\text{C}$			100	μA
		$V_{CE} = 650\text{V}$, $V_{GE} = 0\text{V}$, $T_J = 150^\circ\text{C}$			10	mA
Gate Leakage Current	I_{GES}	$V_{CE} = 0\text{V}$, $V_{GE} = \pm 20\text{V}$, $T_J = 25^\circ\text{C}$	-200		200	nA
Short Circuit Current	I_{SC}	$T_{psc} \leq 5\mu\text{s}$, $V_{GE} = 15\text{V}$ $T_J = 150^\circ\text{C}$, $V_{CC} = 400\text{V}$		395		A
Gate Charge	Q_G	$V_{GE} = 400\text{V}$, $I_C = 75\text{A}$, $V_{CE} = 15\text{V}$		360		nC
Input Capacitance	C_{IES}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		4400		pF
Reverse Transfer Capacitance	C_{RES}			200		
Turn-on delay time	$T_{d(ON)}$	$V_{CC} = 400\text{V}$; $V_{GE} = 15\text{V}$; $I_C = 75\text{A}$; $R_G = 7.5\Omega$; Inductive load	$T_J = 25^\circ\text{C}$	24		ns
			$T_J = 125^\circ\text{C}$	26		
			$T_J = 150^\circ\text{C}$	26		
Rise time	T_r		$T_J = 25^\circ\text{C}$	40		
			$T_J = 125^\circ\text{C}$	42		
			$T_J = 150^\circ\text{C}$	42		
Turn-off delay time	$T_{d(OFF)}$		$T_J = 25^\circ\text{C}$	190		
			$T_J = 125^\circ\text{C}$	220		
			$T_J = 150^\circ\text{C}$	230		
Fall time	T_f		$T_J = 25^\circ\text{C}$	80		
			$T_J = 125^\circ\text{C}$	110		
			$T_J = 150^\circ\text{C}$	120		
Turn-On Switching Energy	E_{on}		$T_J = 25^\circ\text{C}$	2.35		mJ
Turn-Off Switching Energy	E_{off}		$T_J = 150^\circ\text{C}$	3.25		
			$T_J = 25^\circ\text{C}$	2.36		
		$T_J = 150^\circ\text{C}$	3.27			

Anti-Parallel Diode Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	$I_F = 75\text{A}$; $V_{GE} = 0\text{V}$; $T_j = 25^\circ\text{C}$;		1.9	2.4	V
		$I_F = 75\text{A}$; $V_{GE} = 0\text{V}$; $T_j = 125^\circ\text{C}$;		1.7		
		$I_F = 75\text{A}$; $V_{GE} = 0\text{V}$; $T_j = 150^\circ\text{C}$;		1.65		
Reverse Recovery Time	T_{rr}	$I_F = 75\text{A}$; $V_R = 400\text{V}$; $di_F/dt = -1950\text{A}/\mu\text{s}$; $T_j = 150^\circ\text{C}$;		162		ns
Peak Reverse Recovery Current	I_{RRM}			62		A
Reverse Recovery Charge	Q_{RR}			5		μC
Reverse Recovery Energy	E_{rec}			1.25		mJ

Typical Performance Characteristics

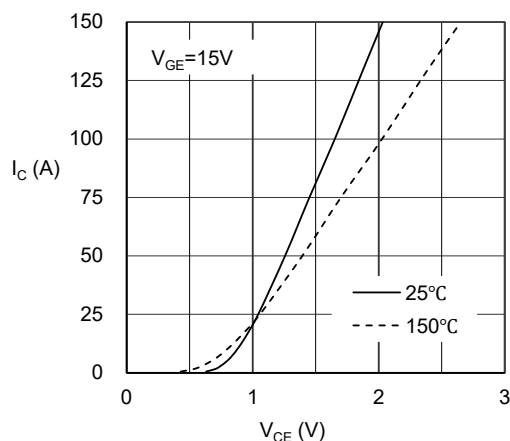


Figure 1: Typical Output Characteristics

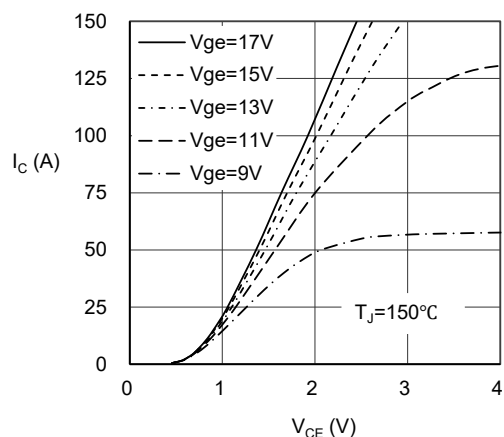


Figure 2: Typical Output Characteristics

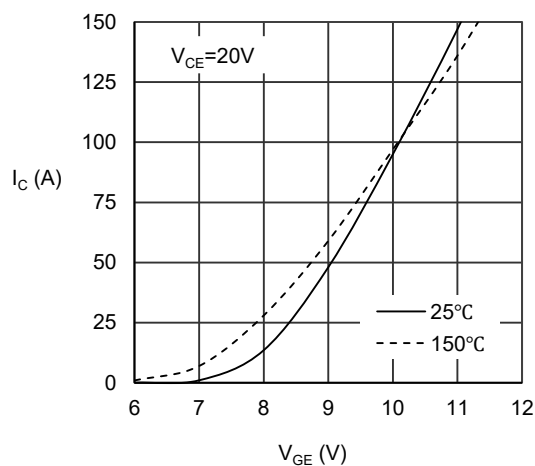


Figure 3: Typical Transfer characteristics

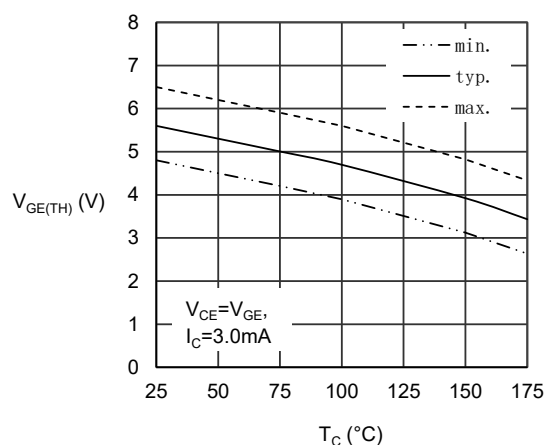


Figure 4: Collector-Emitter Voltage vs T_C

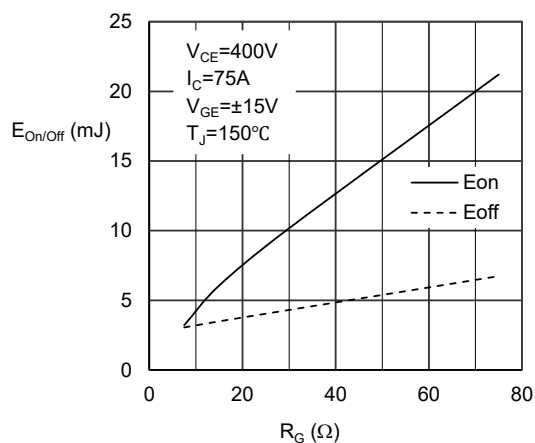


Figure 5: Switching Energy vs Gate Resistor

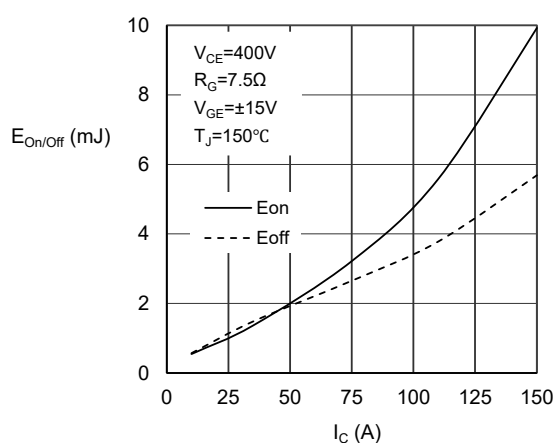


Figure 6: Switching Energy vs Collector Current

Typical Performance Characteristics (cnt'd)

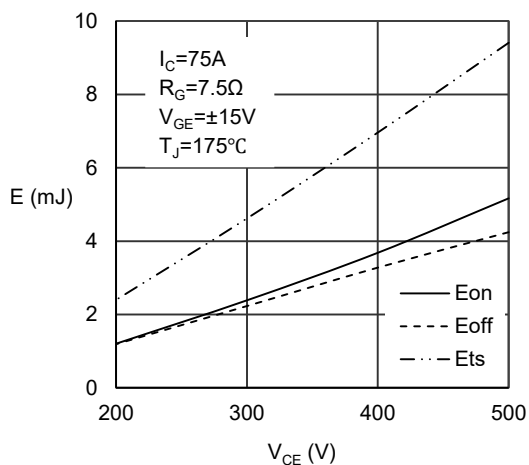


Figure 7: Switching Energy vs Collector-Emitter Voltage

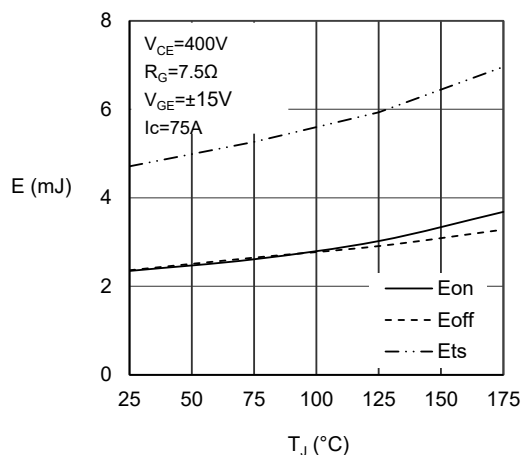


Figure 8: Switching Energy vs Collector Current IGBT

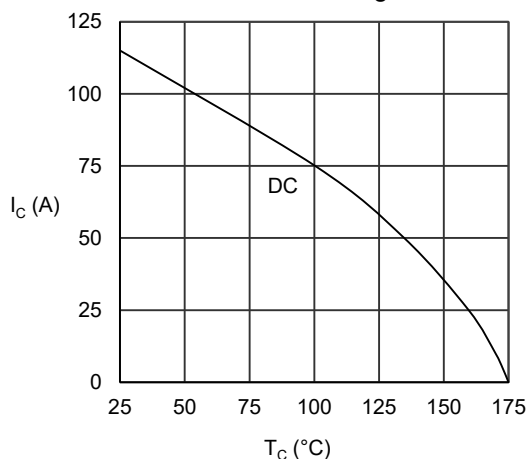


Figure 9: Collector Current vs Case temperature (IGBT)

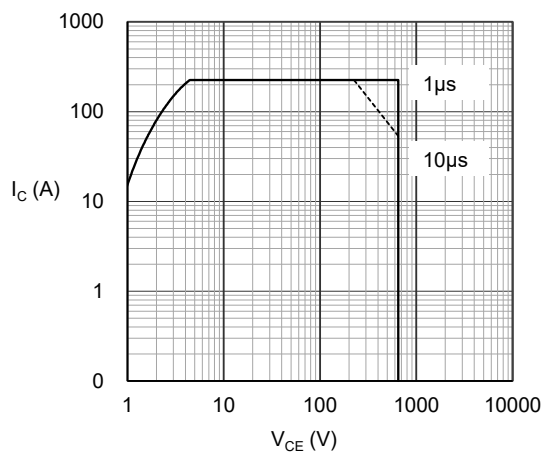


Figure 10: Forward Biased Safe Operating Area

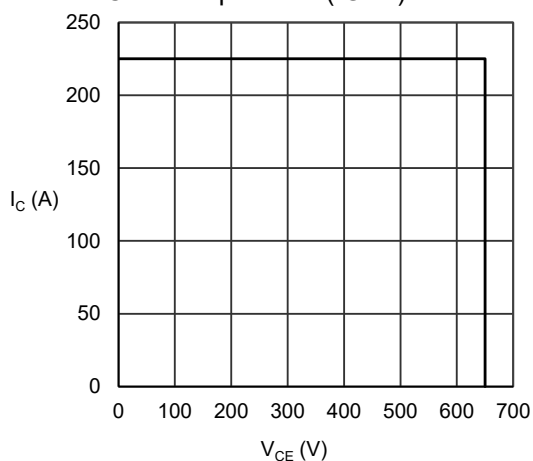


Figure 11: Reverse Biased Safe Operating Area (IGBT)

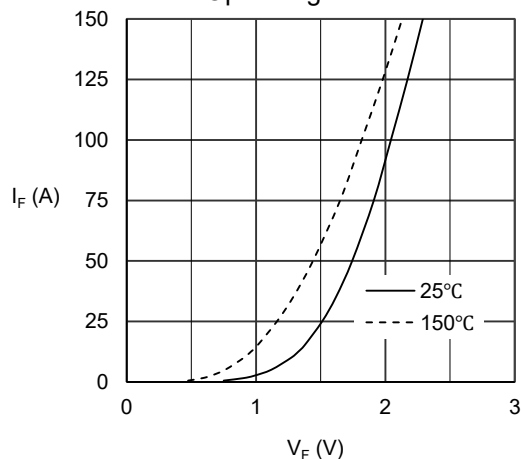


Figure 12: Diode Forward Characteristics

Typical Performance Characteristics (cnt'd)

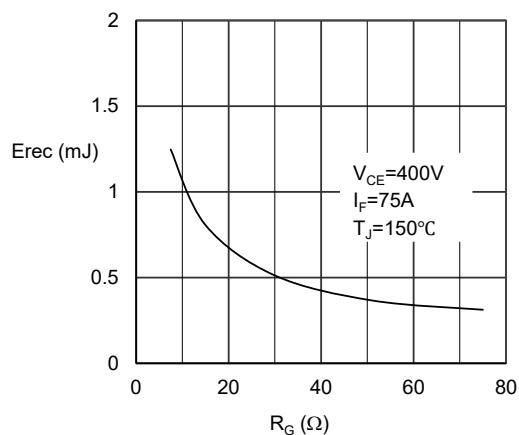


Figure 13: Switching Energy vs Gate Resistor Diode

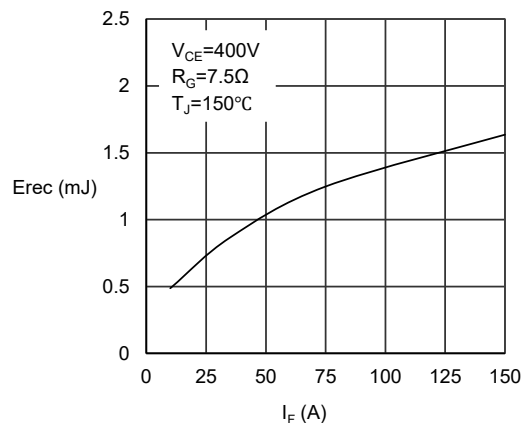


Figure 14: Switching Energy vs Forward Current Diode

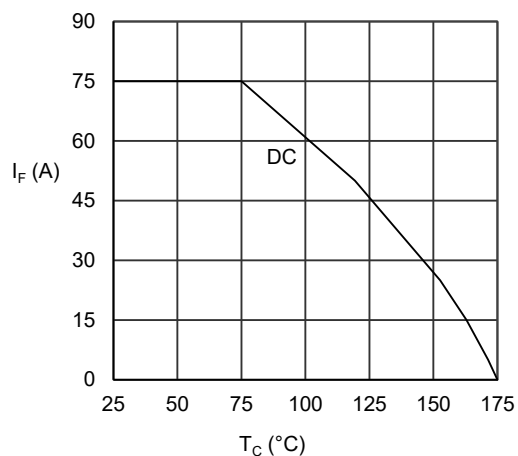


Figure 15: Forward current vs Case temperature (Diode)

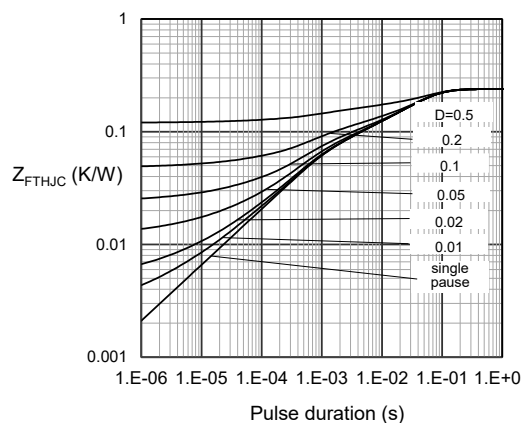


Figure 16: IGBT Transient Thermal Impedance

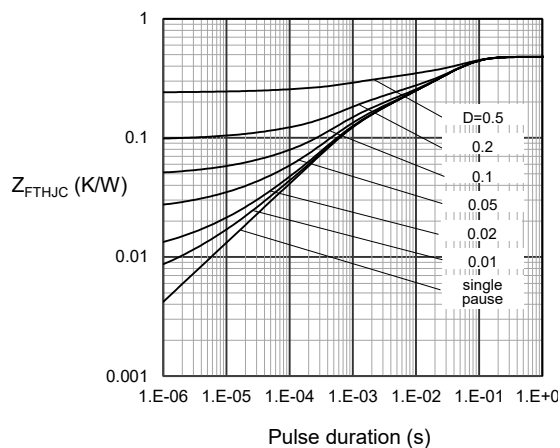
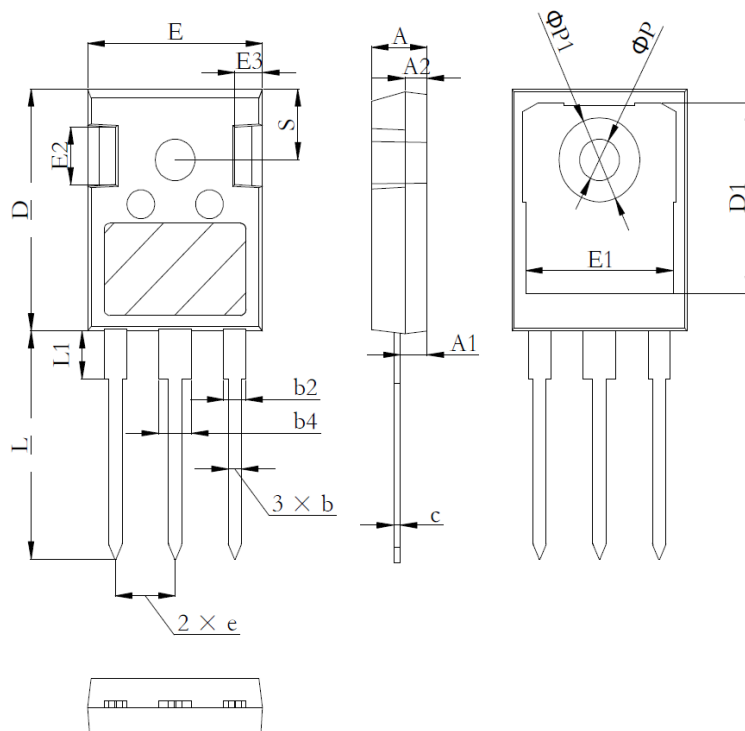


Figure 17: Diode Transient Thermal Impedance

Package Dimensions



Symbol	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.10	1.23	1.36
b2	1.90	2.05	2.20
b4	2.90	3.05	3.20
c	0.50	0.60	0.75
e	5.44BSC		
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
L	19.60	19.91	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

Dimensions in (mm)

Ordering Information

Product Name	Ordering Reference	Package	Marking
CMT-PLA0BN06075MA	CMT-PLA0BN06075MA	TO-247-3L	PLA0BN06075MA

Contact & Ordering

CISOID S.A.

Headquarters and contact EMEA:	CISOID S.A. – Rue Francqui, 11 – 1435 Mont Saint Guibert - Belgium T : +32 10 48 92 10 Email : sales@cisoid.com
Sales Representatives:	Visit our website: http://www.cisoid.com

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