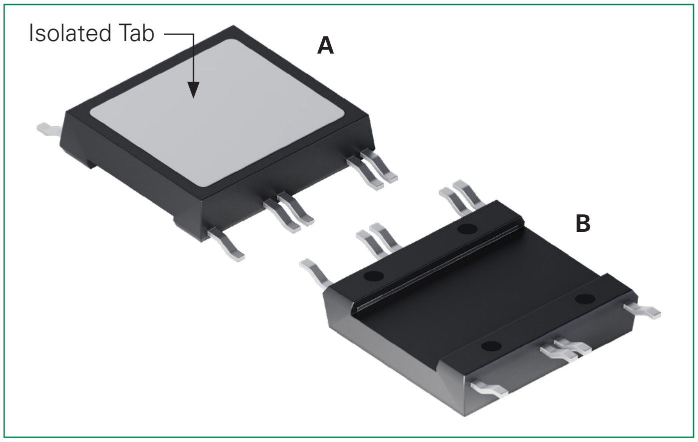
MMIX4B22N300

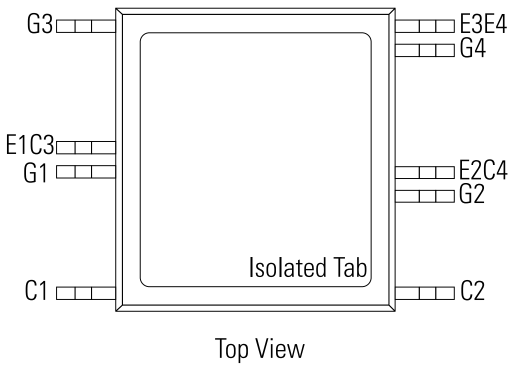
3000 V, 22 A High Voltage, High Gain BiMOSFET™ Monolithic Bipolar MOS Transistor

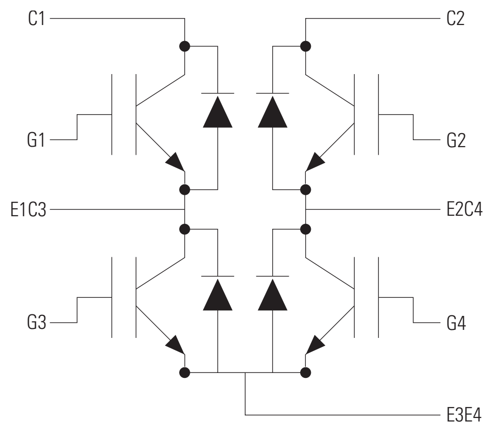
E153432



A: Top, **B:** Bottom

Pinout Diagram (SMPD-Y)





G: Gate; **C:** Collector; **E:** Emitter

Descripton

The MMIX4B22N300 is a high - voltage, quad N - channel BIMOSFET (monolithic bipolar MOS transistor) rated for 3000 V collector-emitter voltage and 22 A continuous collector current at 90 °C in SMPD package with an electrically isolated tab. It targets switch-mode and resonant - mode power supplies and capacitor discharge circuits that require high blocking voltages and high peak current capability.

Features

- Silicon chip on direct-copper bond (DCB) substrate
- Isolated mounting surface
- 4000 V~ electrical isolation
- High blocking voltage
- High peak current capability
- Low saturation voltage

Benefits

- Low gate drive requirement
- High power density
- Reduces need for oversized components
- Improves overall system efficiency
- Enables safe mounting to heatsink

Applications

- Switch-mode and resonant-mode power supplies
- Capacitor discharge circuits

Product Summary

Characteristic	Value	Unit
V_{CES}	3000	V
I_C @ 90 °C	22	A
$V_{CE(sat)}$	≤ 2.7	V

Maximum Ratings

Symbol	Characteristic	Conditions	Value	Unit
V_{CES}	Collector-Emitter Voltage	T_{vj} = 25 °C to 150 °C	3000	V
V_{CGR}	Collector-Gate Voltage	T_{vj} = 25 °C to 150 °C R_{GE} = 1 mΩ	3000	V
V_{GES}	Gate-Emitter Voltage	–	±20	V
V_{GEM}	Transient Gate-Emitter Voltage	–	±30	V
I_C	Collector Current	T_c = 25 °C	38	A
		T_c = 90 °C	22	A
I_{CM}	Peak Collector Current	T_c = 25 °C, t_p = 1 ms	165	A
P_{tot}	Collector Power Dissipation	T_c = 25 °C	150	W
T_{vj}	Virtual Junction Temperature Range	–	–55 to 150	°C
T_{stg}	Storage Temperature Range	–	–55 to 150	°C
T_L	Maximum Lead Temperature For Soldering	–	300	°C
T_{sold}	Soldering Temperature	Plastic body for 10 s	260	°C
V_{ISOL}	Isolation Withstand Voltage	50/60 Hz, 1 minute	4000	V
SSOA (RBSOA)	Switching Safe Operating Area (Reverse Biased Safe Operating Area)	V_{GE} = 15 V, T_{vj} = 125 °C, $R_{G(ext)}$ = 15 Ω, $I_{CM} \leq V_{CES}$	180	A
			1500	V
T_{SC} (SCSOA)	Short Circuit Duration (Short Circuit Safe Operating Area)	V_{GE} = 15 V, T_{vj} = 125 °C, $R_{G(ext)}$ = 52 Ω, V_{CE} =1500 V, non-repetitive	10	µs

Electrical Characteristics – Static (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	I_C = 250 µA, V_{GE} = 0 V	3000	–	–	V
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C = 250 µA, $V_{CE} = V_{GE}$	3	–	5	V
I_{CES}	Collector-Emitter Leakage Current[2]	$V_{CE} = V_{CES}$, V_{GE} = 0 V	–	–	35	µA
		$V_{CE} = V_{CES}$, V_{GE} = 0 V, T_{vj} = 125 °C	–	–	1.5	mA
I_{GES}	Gate Leakage Current	V_{CE} = 0 V, V_{GE} = ±20 V	–	–	±100	nA
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage[1]	I_C = 22 A, V_{GE} = 15 V	–	2.2	2.7	V
		I_C = 22 A, V_{GE} = 15 V, T_{vj} = 125 °C	–	2.7	–	V

Revised: A0.07/22/2026 (0.1)

Electrical Characteristics – Dynamic (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristic	Conditions		Value Min.	Value Typ.	Value Max.	Unit
g_{fs}	Transconductance[1]	I_C = 22 A, V_{CE} = 10 V		13	22	–	S
C_{ies}	Input Capacitance	V_{CE} = 25 V, V_{GE} = 0 V, f = 1MHz		–	2200	–	pF
C_{oes}	Output Capacitance			–	85	–	
C_{res}	Reverse Transfer Capacitance			–	30	–	
Q_G	Total Gate Charge	I_C = 22 A, V_{GE} = 15 V, V_{CE} = 1500 V		–	110	–	nC
Q_{GE}	Gate-Emitter Charge			–	13	–	
Q_{GC}	Gate-Collector Charge			–	45	–	
$t_{d(on)}$	Turn-On Delay Time	Resistive Switching Times, I_C = 22 A, V_{GE} = 15 V, V_{CE} = 960 V, $R_{G(ext)}$ = 15 Ω	T_{vj} = 25 °C	–	46	–	ns
			T_{vj} = 125 °C	–	43	–	
t_r	Rise Time		T_{vj} = 25 °C	–	360	–	ns
			T_{vj} = 125 °C	–	700	–	
$t_{d(off)}$	Turn-Off Delay Time		T_{vj} = 25 °C	–	205	–	ns
			T_{vj} = 125 °C	–	220	–	
t_f	Fall Time		T_{vj} = 25 °C	–	1820	–	ns
			T_{vj} = 125 °C	–	1650	–	

Electrical Characteristics - Reverse Diode (T_{vj} = 25 °C unless otherwise specified)

Symbol	Characteristic	Conditions	Value Min.	Value Typ.	Value Max.	Unit
V_F	Forward Voltage[1]	I_F = 22 A, V_{GE} = 0 V	–	–	2.7	V
t_{rr}	Reverse Recovery Time	I_F = 11 A, V_{GE} = 0 V, $-di_F/dt$ = 100 V, V_{GE} = 0 V	–	1.4	–	µs
I_{rrm}	Peak Reverse Recovery Current		–	30	–	A
Q_{rr}	Reverse Recovery Charge		–	21	–	µC

Note 1: Pulse test, t ≤ 300 µs, duty cycle, d ≤ 2%.
Note 2: Device must be heatsunk for high temperature leakage current measurements to avoid thermal runaway.
Additional provisions for lead-to-lead voltage isolation are required at V_{CE} > 1200 V.

Thermal Characteristics

Symbol	Characteristic	Value Min.	Value Typ.	Value Max.	Unit
$R_{th(j-c)}$	Thermal Resistance Junction To Case - IGBT	–	–	0.83	K/W
$R_{th(c-sold)}$	Thermal Resistance Junction To Soldering Point - IGBT	–	0.05	–	K/W
$R_{th(j-a)}$	Thermal Resistance Junction To Ambient - IGBT	–	30	–	K/W

Package

Symbol	Characteristic	Value Min.	Value Typ.	Value Max.	Unit
G	Package Weight	–	–	8	g

Characteristic Curves

Fig. 1. Typical Output Characteristics @ T_{vj} = 25 °C

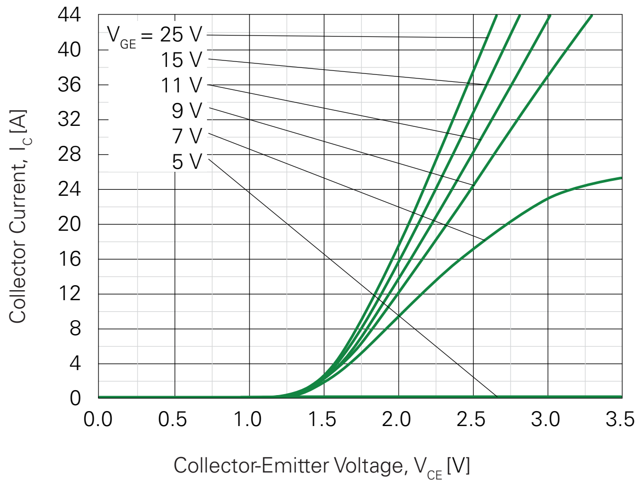


Fig. 2. Typical Extended Output Characteristics @ T_{vj} = 25 °C

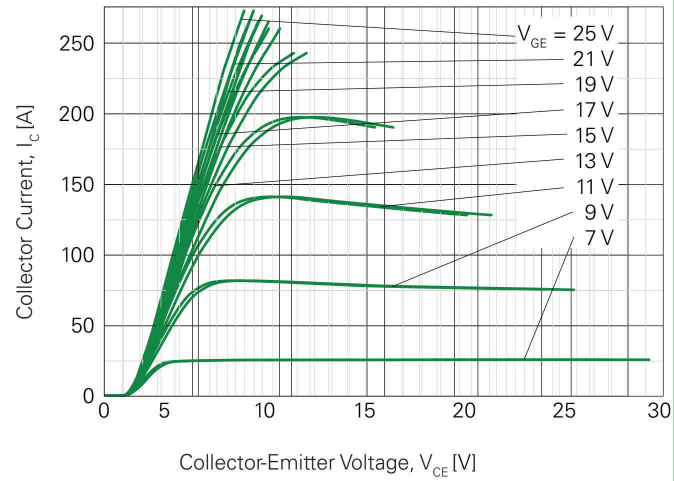


Fig. 3. Typical Output Characteristics @ T_{vj} = 125 °C

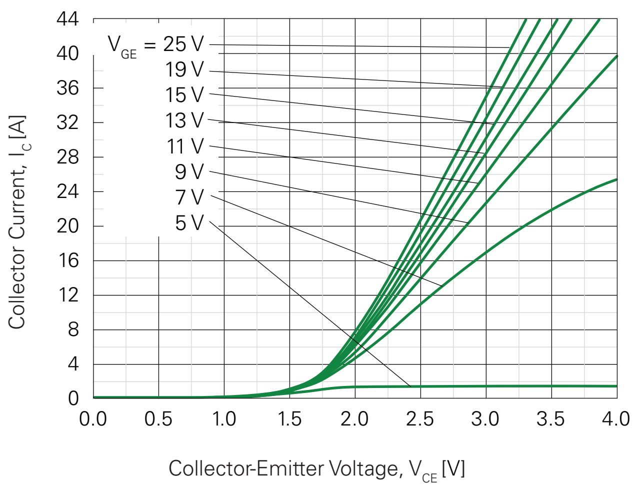


Fig. 4. Typical Collector-Emitter Saturation Voltage vs. Virtural Junction Temperature

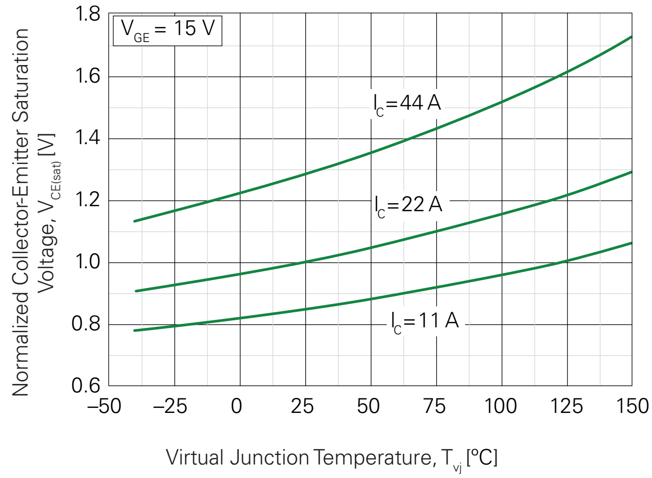


Fig. 5. Typical Collector-Emitter Voltage vs. Gate-Emitter Voltage

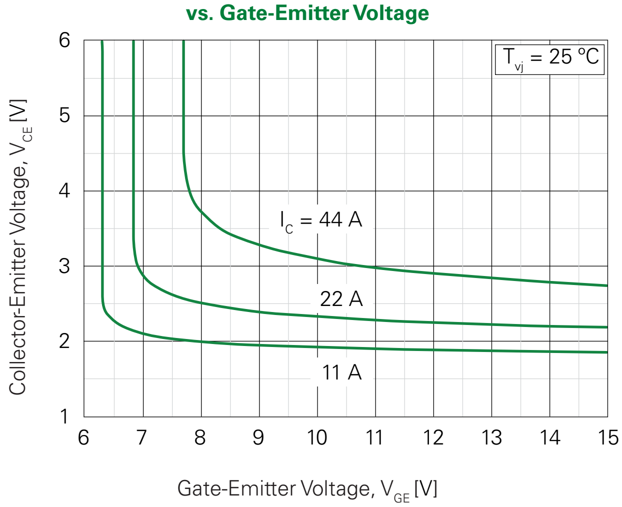


Fig. 6. Typical Transfer Characteristics

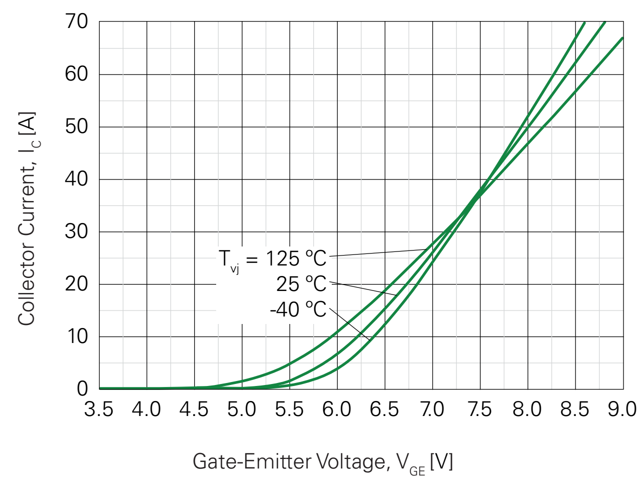


Fig. 9. Typical Forward Characteristics of a Reverse Diode

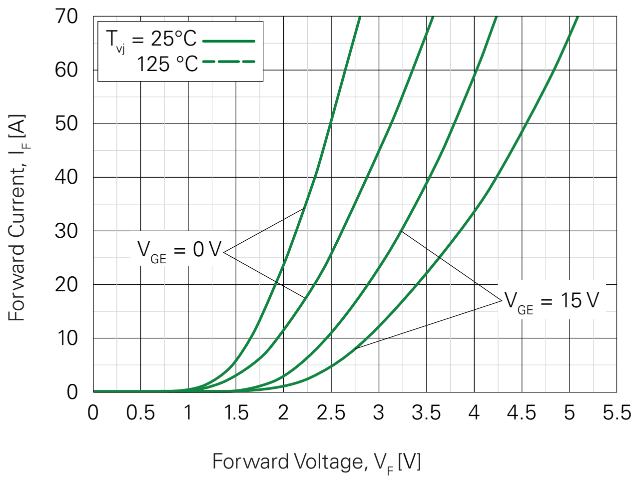


Fig. 10. Typical Junction Capacitance Characteristics

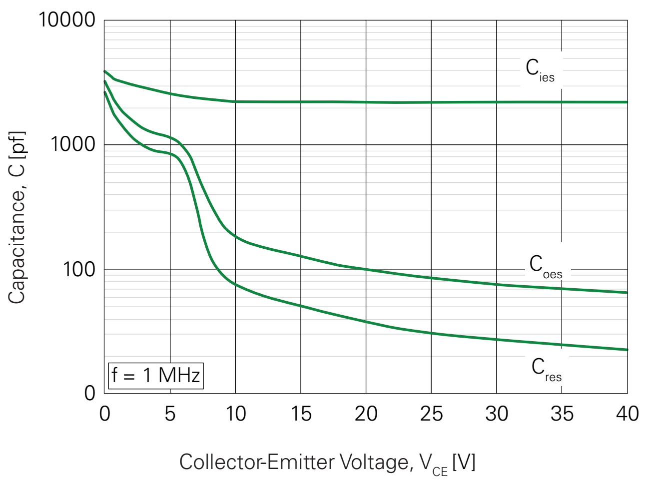


Fig. 11. Reverse-Bias Safe Operating Area (RB

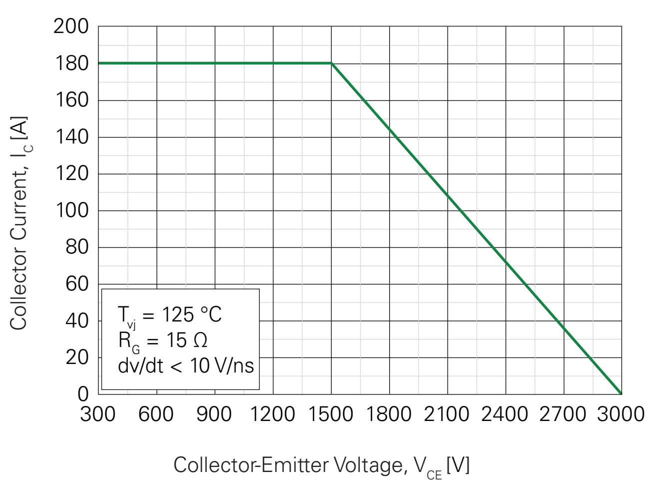


Fig. 12. Maximum Transient Thermal Impedance

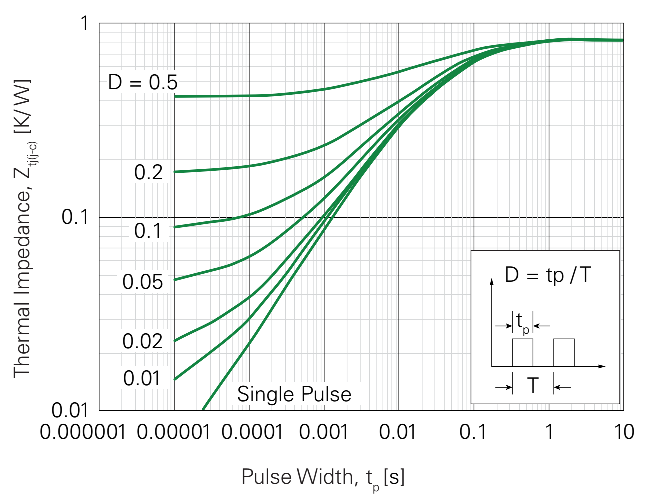


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 25 °C

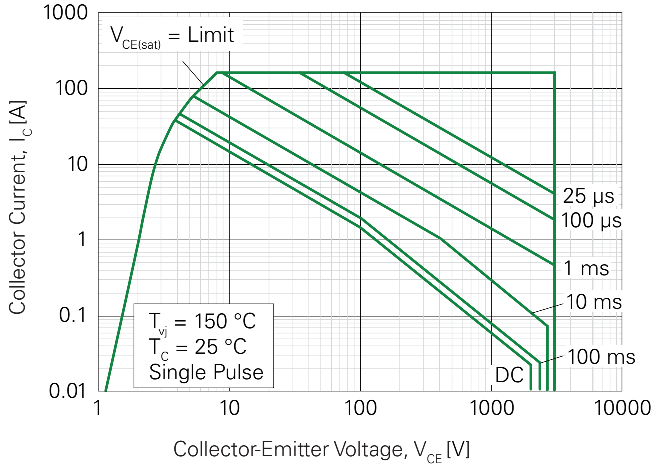
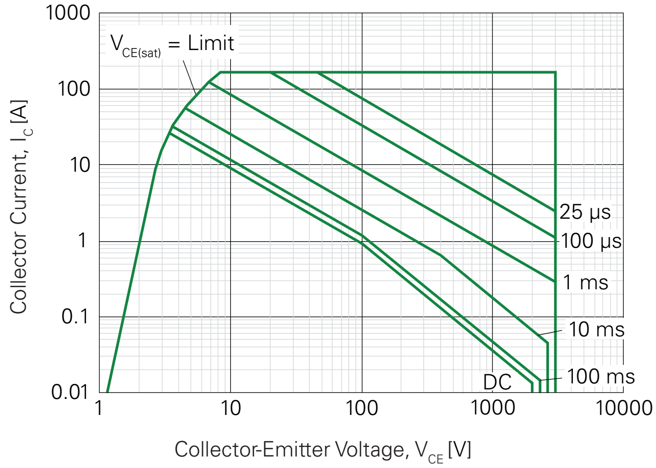
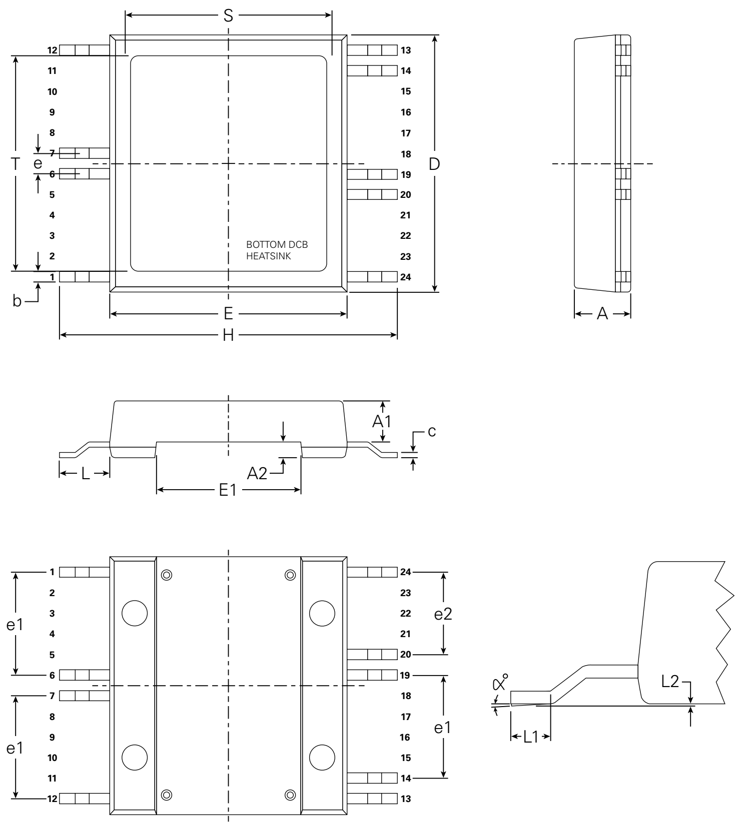


Fig. 14. Forward-Bias Safe Operating Area @ T_C = 75 °C



Part Outline Drawing (SMPD-Y)

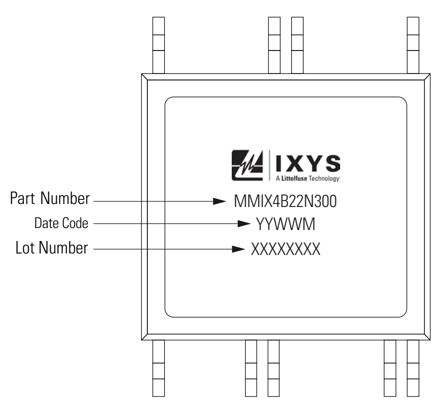


Symbol	Inches			Millimeters		
	Min.	**Typical**	**Max.**	**Min.**	**Typical**	**Max**
A	0.209	–	0.224	5.30	–	5.70
A1	0.154	–	0.161	3.90	–	4.10
A2	0.055	–	0.063	1.40	–	1.60
b	0.035	–	0.045	0.90	–	1.15
c	0.018	–	0.026	0.45	–	0.65
D	0.976	–	0.994	24.80	–	25.25
E	0.898	–	0.915	22.80	–	23.25
E1	0.543	–	0.559	13.80	–	14.20
e	0.079 BSC			2.00 BSC		
e1	0.394 BSC			10.00 BSC		
e2	0.315 BSC			8.00 BSC		
H	1.272	–	1.311	32.30	–	33.30
L	0.181	–	0.209	4.60	–	5.30
L1	0.051	–	0.067	1.30	–	1.70
L2	0.000	–	0.006	0.00	–	0.15
S	0.742	–	0.792	18.85	–	20.12
T	0.822	–	0.872	20.90	–	22.17
∝	0	–	4°	0	–	4°

Ordering Information

Orderable Part Number	Package Type	Shipping Form	Shipping Quantity
MMIX4B22N300	SMPD-Y	T&R	200
MMIX4B22N300	SMPD-Y	Tube	20

Part Numbering and Marking



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