



VB029 / VB029SP VB029(011Y) / VB029(012Y)

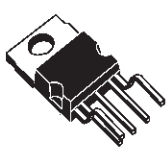
HIGH VOLTAGE IGNITION COIL DRIVER POWER I.C.

TYPE	V_{cl}	I_{cl}	$I_{d(on)}$
VB029	320V	12A	230mA
VB029SP			
VB029(011Y)			
VB029(012Y)			

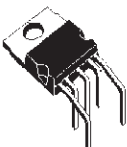
- PRIMARY COIL VOLTAGE INTERNALLY SET
- COIL CURRENT LIMIT INTERNALLY SET
- LOGIC LEVEL COMPATIBLE INPUT
- DRIVING CURRENT QUASI PROPORTIONAL TO COLLECTOR CURRENT
- DOUBLE FLAG-ON COIL CURRENT
- DARLINGTON BASE ACCESSIBLE

DESCRIPTION

The VB029, VB029SP, VB029(011Y) VB029(012Y) are a high voltage power integrated circuit designed in STMicroelectronics VIPower™ technology, with vertical current flow power darlington and logic level compatible driving circuit. Built-in protection circuit for coil current limiting and collector voltage clamping allows the device to be used as smart, high voltage, high



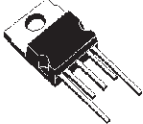
PENTAWATT HV



PENTAWATT HV (011Y)



PowerSO-10™



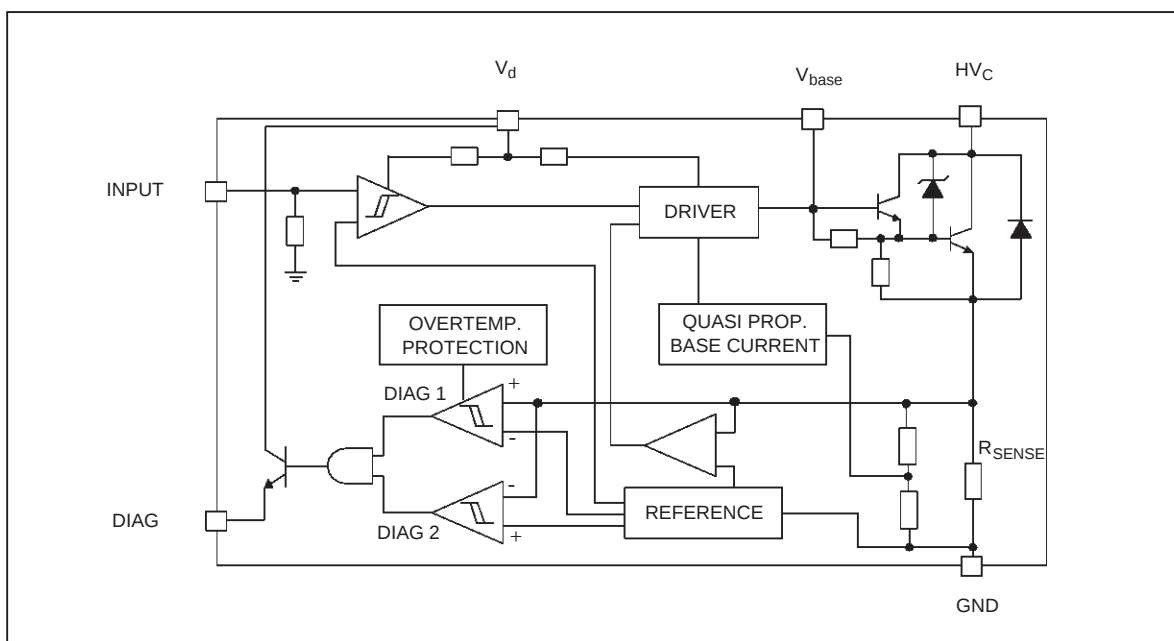
PENTAWATT HV (012Y)

ORDER CODES:

PowerSO-10™	VB029SP
PENTAWATT HV	VB029
PENTAWATT HV (011Y)	VB029(011Y)
PENTAWATT HV (012Y)	VB029(012Y)

current interface in advanced electronic ignition system.

BLOCK DIAGRAM



VB029 / VB029SP / VB029(011Y) / VB029(012Y)

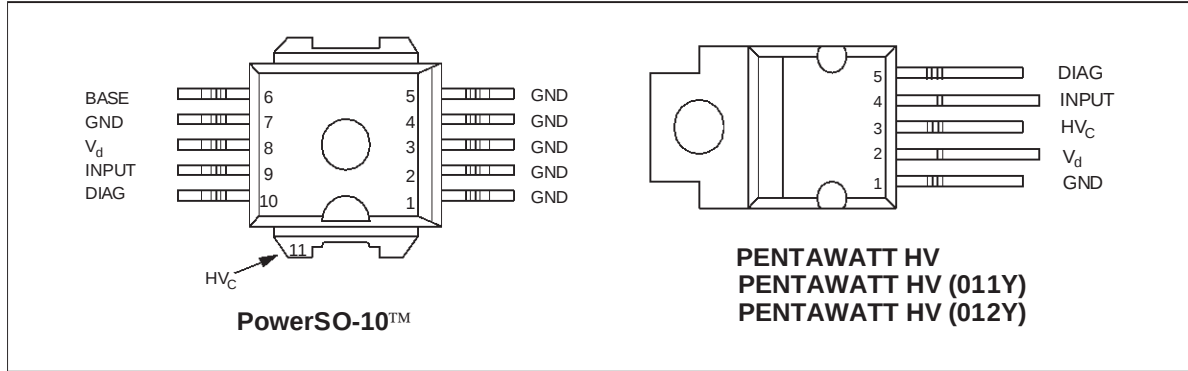
ABSOLUTE MAXIMUM RATING

Symbol	Parameter	Value	Unit
HV_C	Collector voltage	Internally limited	V
I_C	Collector current	Internally limited	A
V_d	Driving stage supply voltage	7	V
I_d	Driving circuitry supply current	230	mA
V_{IN}	Input voltage	10	V
T_j	Junction operating temperature	-40 to 150	°C
T_{stg}	Storage temperature	-55 to 150	°C

THERMAL DATA

Symbol	Parameter	Value		Unit
		PowerSO-10™	PENTAWATT HV	
$R_{thj-case}$	Thermal resistance junction-case (MAX)	1.12	1.12	°C/W
$R_{thj-amb}$	Thermal resistance junction-ambient (MAX)	62.5	62.5	°C/W

CONNECTION DIAGRAM (TOP VIEW)



PIN FUNCTION (PowerSO-10™)

No	Name	Function
1÷5	GND	Emitter power ground
6	BASE	Darlington base
7(*)	GND	Control ground
8	V_d	Driving stage supply voltage
9	INPUT	Logic input channel
10	DIAG	Diagnostic output signal
TAB	HV_C	Primary coil output signal

(*) Pin 1÷5=Power GND, Pin 7=signal GND. Pin 7 must be connected to pins 1÷5 externally.

PIN FUNCTION (PENTAWATT HV)

No	Name	Function
1	GND	Emitter power ground
2	V_d	Driving stage supply voltage
3	HV_C	Primary coil output signal
4	INPUT	Logic input channel
5	DIAG	Diagnostic output signal

VB029 / VB029SP / VB029(011Y) / VB029(012Y)

ELECTRICAL CHARACTERISTICS ($V_{CC}=13.5V$; $V_d=5V$; $T_j=25^\circ C$; $R_{coil}=510m\Omega$; $L_{coil}=7mH$ unless otherwise specified)

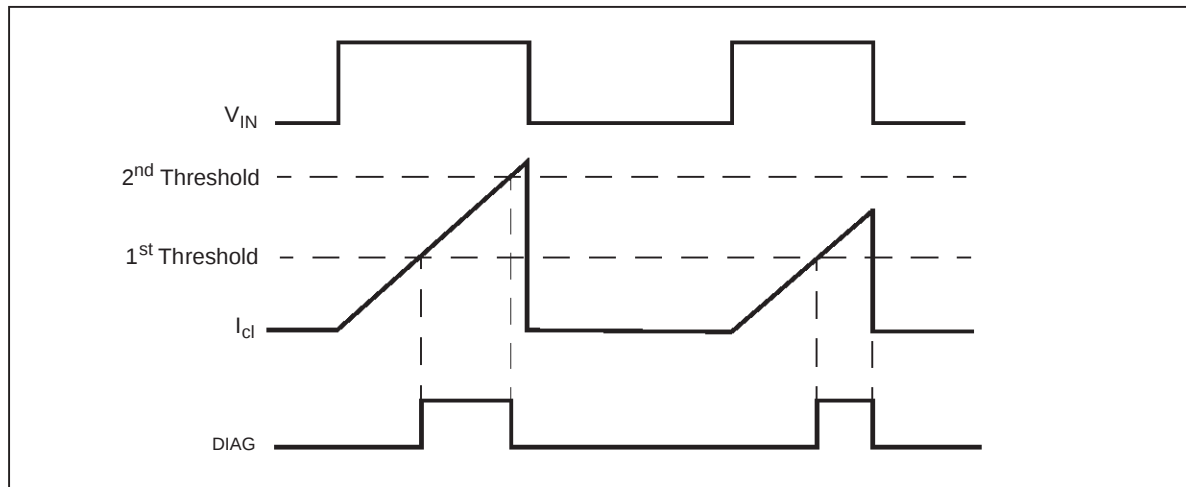
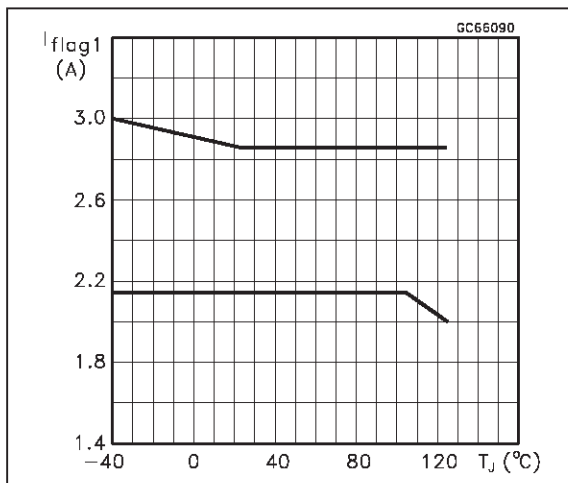
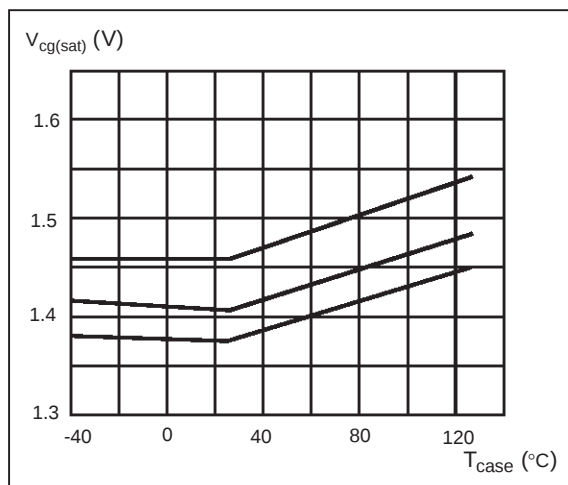
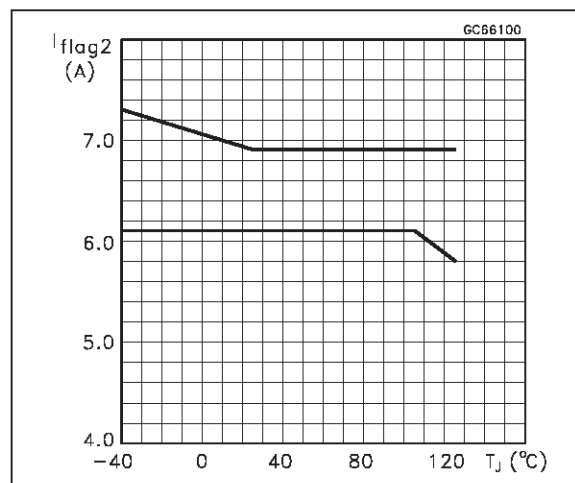
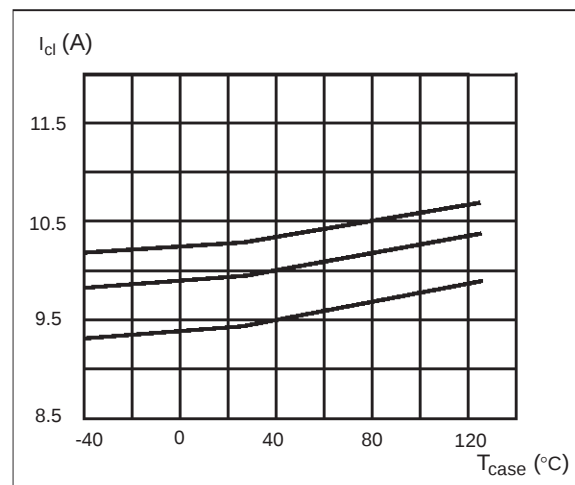
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{cl}	High voltage clamp	$-40^\circ C \leq T_j \leq 125^\circ C$; $I_C=6A$	320	360	420	V
$V_{cg(sat)td}$	Power stage saturation voltage derating in temperature	$I_C=7.6A$; $V_{IN}=4V$; $-40^\circ C \leq T_j \leq 80^\circ C$			2.5	V
		$I_C=7.6A$; $V_{IN}=4V$; $80^\circ C \leq T_j \leq 125^\circ C$			2.8	V
$I_{d(off)}$	Power-off supply current	$V_{IN}=0.4V$			10	mA
$I_{d(on)}$	Power-on supply current	$V_{IN}=4V$; $I_C=7.6A$; $-40^\circ C \leq T_j \leq 125^\circ C$			230	mA
V_d	Driving stage supply voltage		4.5		5.5	V
I_{cl}	Collector current limit	$V_{IN}=4V$; $-40^\circ C \leq T_j \leq 125^\circ C$; (See note 1)			12	A
V_{INH}	High level input voltage		4		5.5	V
V_{INL}	Low level input voltage		0		0.8	V
I_{INH}	High level input current	$V_{IN}=4V$			200	μA
V_{diagH}	High level diagnostic output voltage	$R_{EXT}=22K\Omega$ (See figure 1)	3.5	(*)	V_d	V
V_{diagL}	Low level diagnostic output voltage	$R_{EXT}=22K\Omega$ (See figure 1)			0.5	V
$I_{C(diag1)}$	First threshold level collector current		2.15	2.5	2.85	A
$I_{C(diag1)td}$	First threshold level collector current drift with temperature	(See figure 3)				
$I_{C(diag2)}$	Second threshold level collector current		6.1	6.5	6.9	A
$I_{C(diag2)td}$	Second threshold level collector current drift with temperature	(See figure 4)				
$t_{d(off)}$	Turn-off delay time of output current	$I_C=6A$ (See note 2)		25		μs
$t_{f(off)}$	Turn-off fall time of output current	$I_C=6A$		8		μs
$t_{d(diag)}$	Delay time of diagnostic current	$R_{EXT}=22K\Omega$ (See figure 1)		1		μs
$t_{r(diag)}$	Turn-on rise time of diagnostic current	$R_{EXT}=22K\Omega$ (See figure 1)		1		μs
$t_{f(diag)}$	Turn-off fall time of diagnostic current	$R_{EXT}=22K\Omega$ (See figure 1)		1		μs
ΔI_{th}	Thermal flag shift on first threshold	$T_j > 125^\circ C$ (**)	1			A
$E_{s/b}$	Single pulse avalanche energy		300			mJ

Note 1: the primary coil current value I_{cl} must be measured 1ms after desaturation of the power stage.

Note 2: time from input switching V_{NEG} until collector voltage equal to 200V.

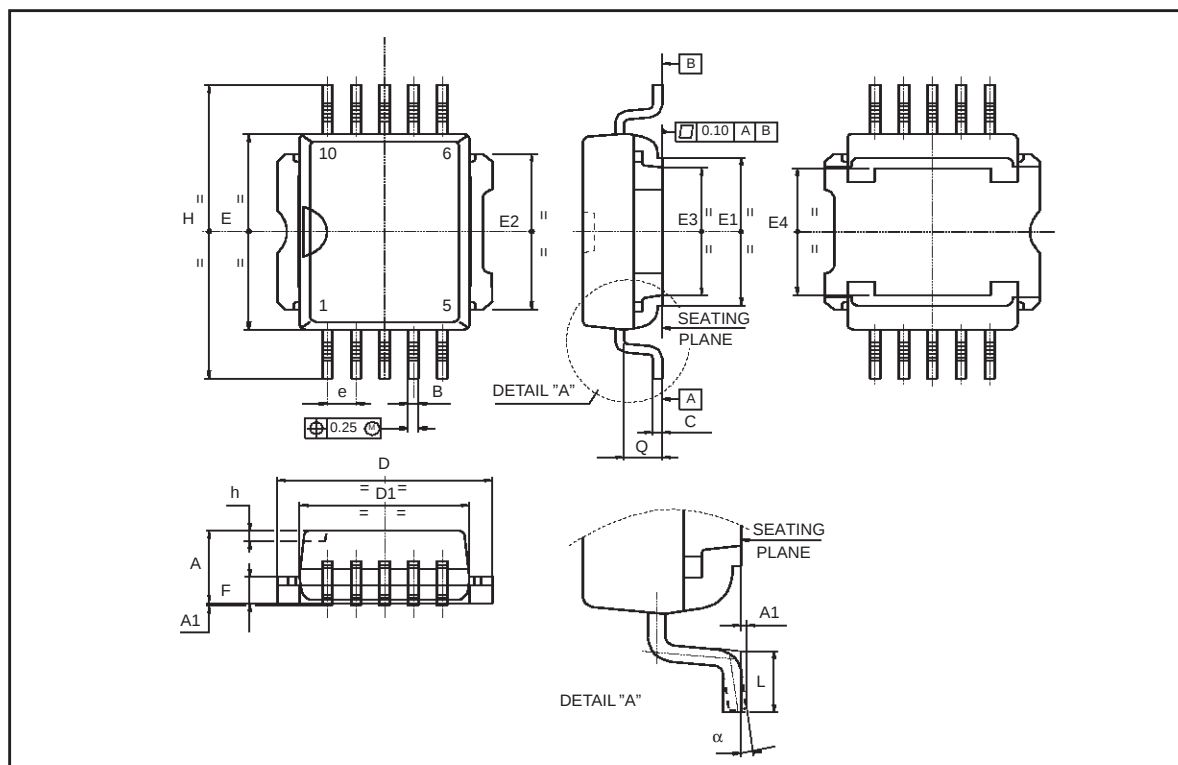
(*) $V_d - V_{be(on)}$

(**) This thermal flag shift cannot be activated for lower than $125^\circ C$.

FIGURE 2: Switching waveform**FIGURE 3:** Maximum $I_{C(diag1)}$ VS temperature**FIGURE 5:** Typical $V_{cg(sat)}$ VS temperature ($V_d=4.5V$)**FIGURE 4:** $I_{C(diag2)}$ VS temperature**FIGURE 6:** Typical I_{cl} VS temperature

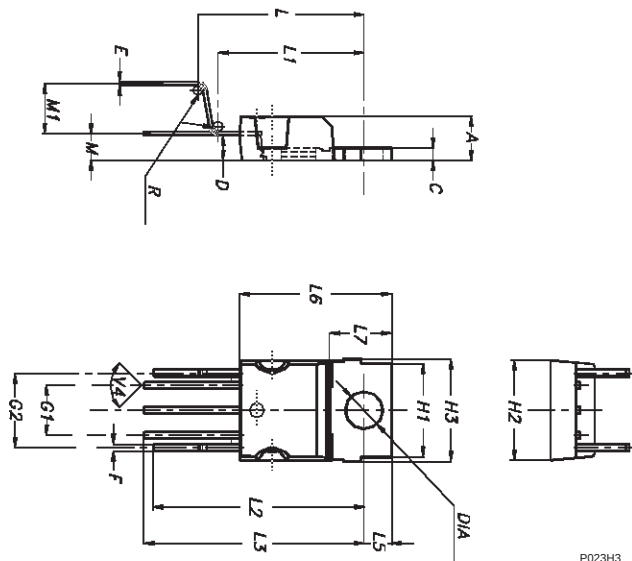
PowerSO-10™ MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	3.35		3.65	0.132		0.144
A1	0.00		0.10	0.000		0.004
B	0.40		0.60	0.016		0.024
c	0.35		0.55	0.013		0.022
D	9.40		9.60	0.370		0.378
D1	7.40		7.60	0.291		0.300
E	9.30		9.50	0.366		0.374
E1	7.20		7.40	0.283		0.291
E2	7.20		7.60	0.283		300
E3	6.10		6.35	0.240		0.250
E4	5.90		6.10	0.232		0.240
e		1.27			0.050	
F	1.25		1.35	0.049		0.053
H	13.80		14.40	0.543		0.567
h		0.50			0.002	
Q		1.70			0.067	
α	0°		8°			



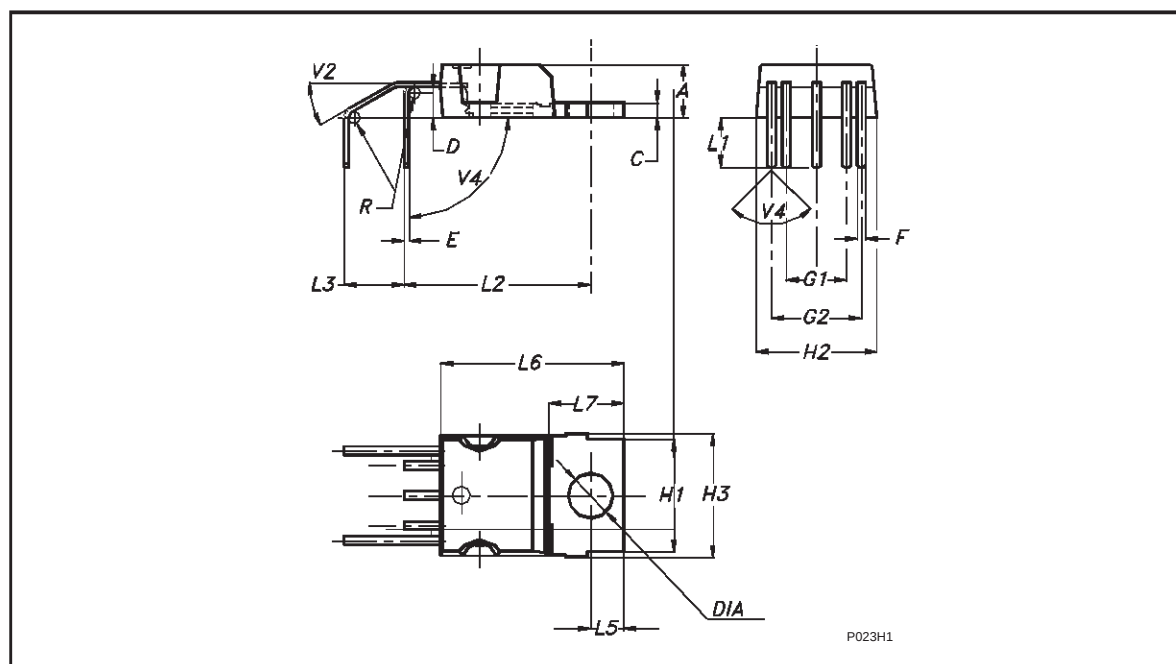
PENTAWATT HV MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.30		4.80	0.169		0.189
C	1.17		1.37	0.046		0.054
D	2.40		2.80	0.094		0.11
E	0.35		0.55	0.014		0.022
F	0.60		0.80	0.024		0.031
G1	4.91		5.21	0.193		0.205
G2	7.49		7.80	0.295		0.307
H1	9.30		9.70	0.366		0.382
H2			10.40			0.409
H3		10.05	10.40		0.396	0.409
L	15.60		17.30	6.14		0.681
L1	14.60		15.22	0.575		0.599
L2	21.20		21.85	0.835		0.860
L3	22.20		22.82	0.874		0.898
L5	2.60		3	0.102		0.118
L6	15.10		15.80	0.594		0.622
L7	6		6.60	0.236		0.260
M	2.50		3.10	0.098		0.122
M1	4.50		5.60	0.177		0.220
R	0.50			0.02		
V4	90° (typ)					
Diam	3.65		3.85	0.144		0.152



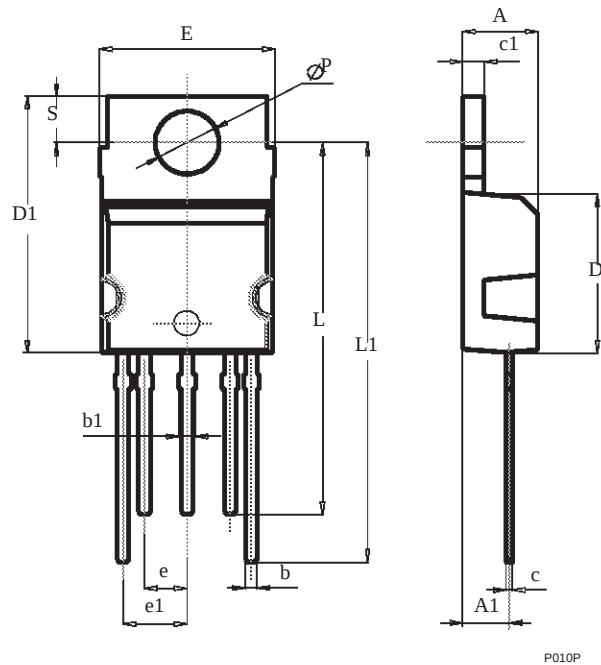
PENTAWATT HV 011Y (horizontal) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.30		4.80	0.169		0.189
C	1.17		1.37	0.046		0.054
D	2.40		2.80	0.094		0.11
E	0.35		0.55	0.014		0.022
F	0.60		0.80	0.024		0.031
G1	4.91		5.21	0.193		0.205
G2	7.49		7.80	0.295		0.307
H1	9.30		9.70	0.366		0.382
H2			10.40			0.409
H3		10.05	10.40		0.396	0.409
L1	3.90		4.50	0.154		0.177
L2	15.10		16.10	0.594		0.634
L3	4.80		5.40	0.189		0.213
L5	2.60		3.00	0.102		0.118
L6	15.10		15.80	0.594		0.622
L7	6.00		6.60	0.236		0.26
R		0.5				
V2	30° (typ)					
V4	90° (typ)					
DIA	3.65		3.85	0.144		0.152



PENTAWATT HV 012Y (in line) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.3		4.8	0.169		0.189
A1	2.5		3.1	0.098		0.122
b	0.6		0.8	0.024		0.031
b1	0.75		0.9	0.03		0.035
c	0.35		0.55	0.014		0.022
c1	1.22		1.42	0.048		0.056
D	9		9.35	0.354		0.368
D1	15.2		15.8	0.598		0.622
e	2.44		2.64	0.096		0.104
e1	3.71		3.91	0.146		0.154
E	10		10.4	0.394		0.409
L	22.32		22.92	0.879		0.902
L1	25.1		25.7	0.988		1.012
P	3.65		3.95	0.144		0.156
S	2.55		3.05	0.1		0.12



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