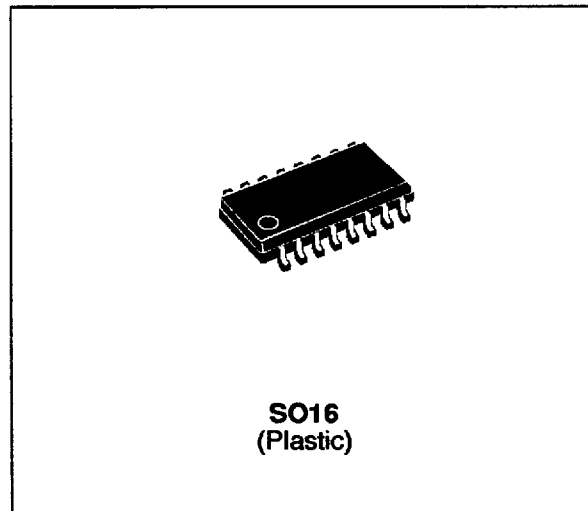


Application Specific Discretes  
A.S.D.<sup>™</sup>

**IGNITION CONTROL CIRCUIT**

**FEATURES AND BENEFITS**

- MONOLITHIC CIRCUIT FOR CAPACITANCE DISCHARGE SYSTEM CONTROL.
- DEDICATED THYRISTOR STRUCTURE FOR IGNITION OPERATION.
- APPLICATION SPECIFIC DISCRETES (ASD<sup>™</sup>).
- SURFACE AREA REDUCTION.
- SO16 PACKAGE.



**DESCRIPTION**

The ICC01 is a high-performance planar-diffused technology adapted to rugged environment conditions.

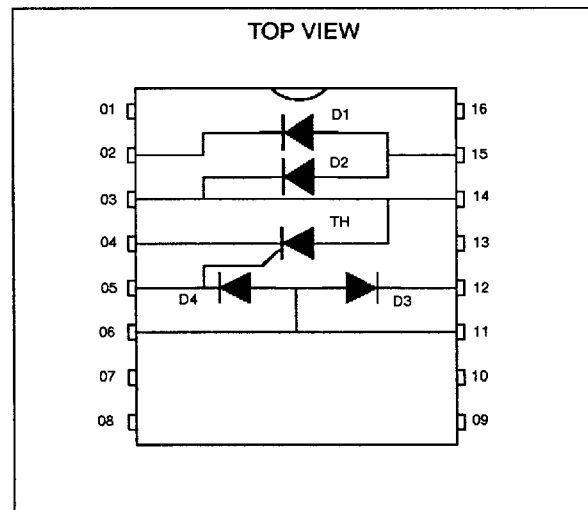
It has been developed especially for small engines using a capacitor discharge technique for ignition operation.

The ICC01 assumes electronics control of the ignition system.

- Pin 2 : Motor stop
- Pin 4/6/11 : Ground
- Pin 5 : Sensor
- Pin 3/14 : Ignition capacitor
- Pin 12/15 : Charging, winding
- Pin 1/7/8/9/10/13/16: Not connected

See basic application and functionality page 4.

**FUNCTIONAL DIAGRAM**



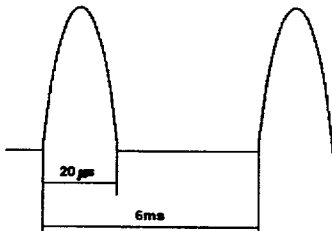
**ABSOLUTE MAXIMUM RATINGS : THYRISTOR TH**

Symbol	Parameter		Value	Unit
$I_{TRM}$	Repetitive peak on-state current (Note1)	$T_I=110\text{ }^\circ\text{C}$	100	A
$I_{TSM}$	Non repetitive surge peak on-state current $T_j \text{ initial} = T_j = 25\text{ }^\circ\text{C}$	$t_p = 20\text{ }\mu\text{s}$	150	A
		$t_p = 10\text{ ms}$	5	A
$V_{DRM}$	Repetitive peak off-state voltage	$T_j = 125\text{ }^\circ\text{C}$	400	V

**ABSOLUTE MAXIMUM RATINGS : DIODES**

Symbol	Parameter		Value				Unit
			D1	D2	D3	D4	
$I_{FRM}$	Repetitive peak forward current (Note 1)	$T_I = 110\text{ }^\circ\text{C}$	1	100	100	1	A
$I_{FSM}$	Non repetitive surge forward current $T_j \text{ initial} = T_j = 25\text{ }^\circ\text{C}$	$t_p = 20\text{ }\mu\text{s}$	15	150	150	15	A
		$t_p = 10\text{ ms}$	2	5	5	2	A
$V_{RRM}$	Repetitive peak off-state voltage	$T_j = 125\text{ }^\circ\text{C}$	25	400	400	25	V

Note 1: Test current waveform



**ABSOLUTE MAXIMUM RATINGS : FOR ALL DEVICES (ICC01)**

Symbol	Parameter	Value	Unit
$T_{sig}$ $T_j$	Storage temperature range Operating junction temperature range	- 40 to +150 - 40 to +150	$^\circ\text{C}$
$T_I$	Maximum lead temperature for soldering during 10s	260	$^\circ\text{C}$

**THERMAL RESISTANCES**

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Thermal resistance junction to ambient	90	$^\circ\text{C/W}$

**ELECTRICAL CHARACTERISTICS : THYRISTOR TH**

Symbol	Test Conditions			Value	Unit
$I_{GT}$	$V_D=12V$ (DC) $R_L=33\Omega$	$T_j=25^\circ C$	MAX	1	mA
$V_{GT}$	$V_D=12V$ (DC) $R_L=33\Omega$	$T_j=25^\circ C$	MAX	1.5	V
$V_{TM}$	$I_{TM} = 4A$ $t_p \leq 1ms$	$T_j=25^\circ C$	MAX	1.9	V
$I_{DRM}$	$V_{DRM}$ rated	$T_j=25^\circ C$	MAX	50	$\mu A$
		$T_j=125^\circ C$	MAX	1	mA

**ELECTRICAL CHARACTERISTICS : DIODE D1/D4**

Symbol	Test Conditions			Value	Unit
$I_R$	$V_R = V_{RRM}$	$T_j=25^\circ C$	MAX	50	$\mu A$
		$T_j=120^\circ C$	MAX	1	mA
$V_F$	$I_F = 100$ mA $t_p \leq 1ms$	$T_j=25^\circ C$	MAX	1.2	V

**ELECTRICAL CHARACTERISTICS : DIODE D2/D3**

Symbol	Test Conditions			Value	Unit
$I_R$	$V_R = V_{RRM}$	$T_j=25^\circ C$	MAX	50	$\mu A$
		$T_j=125^\circ C$	MAX	1	mA
$V_F$	$I_F = 4$ A $t_p \leq 1ms$	$T_j=25^\circ C$	MAX	1.9	V

**ORDERING INFORMATION**

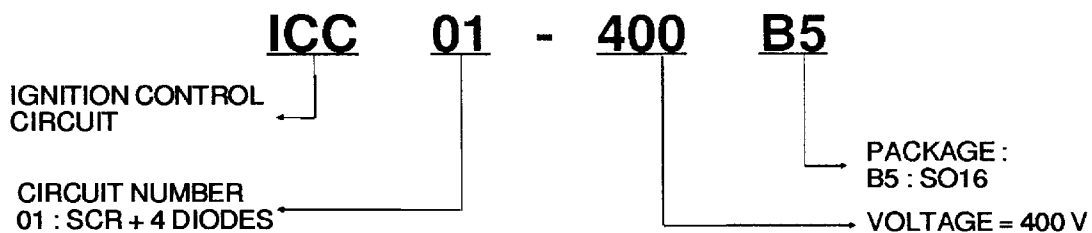


Fig.1 : Relative variation of gate trigger current versus junction temperature.

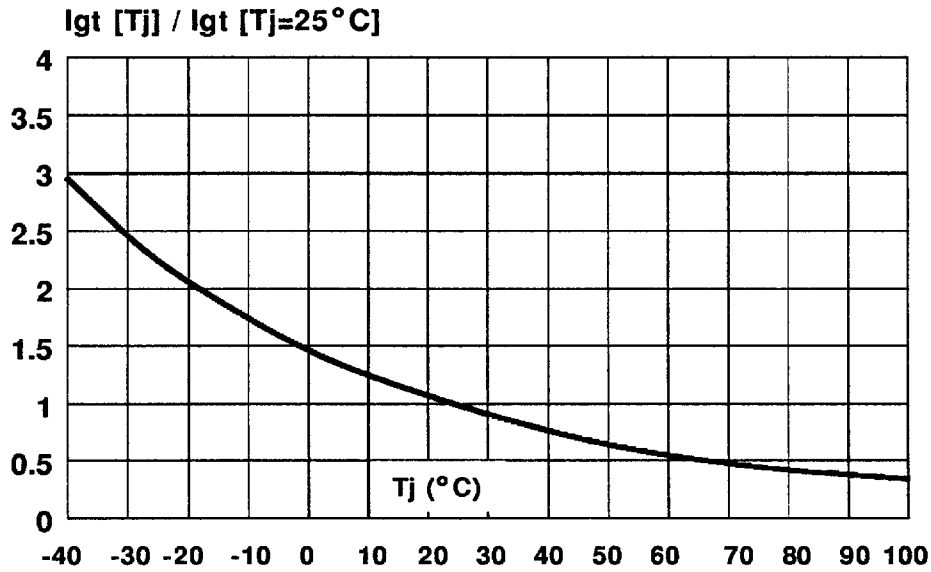
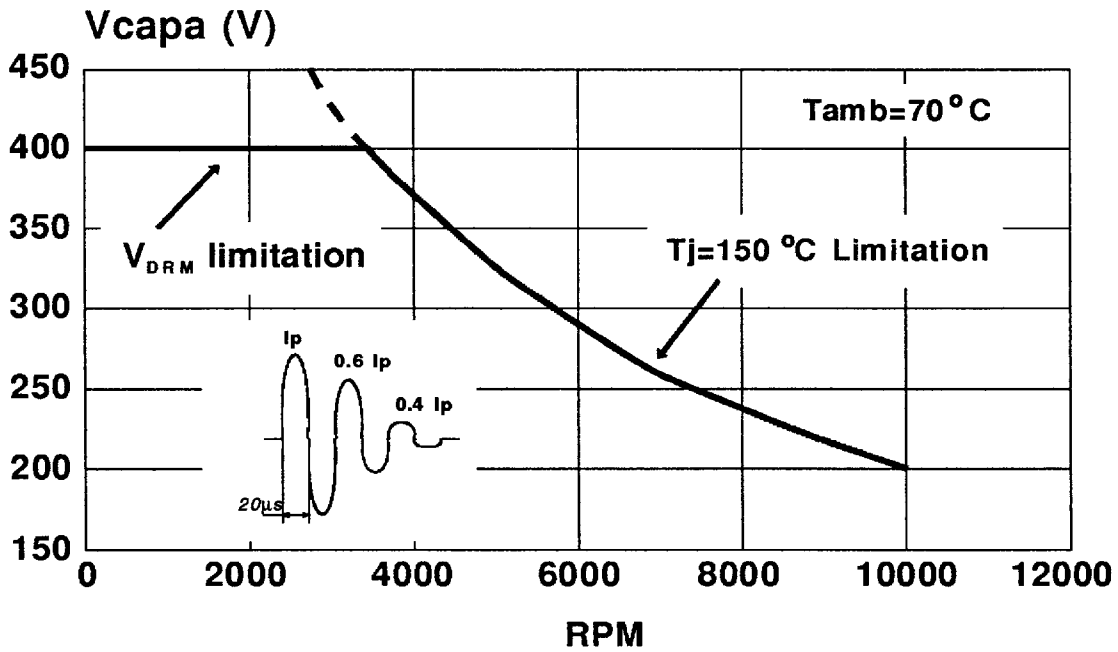
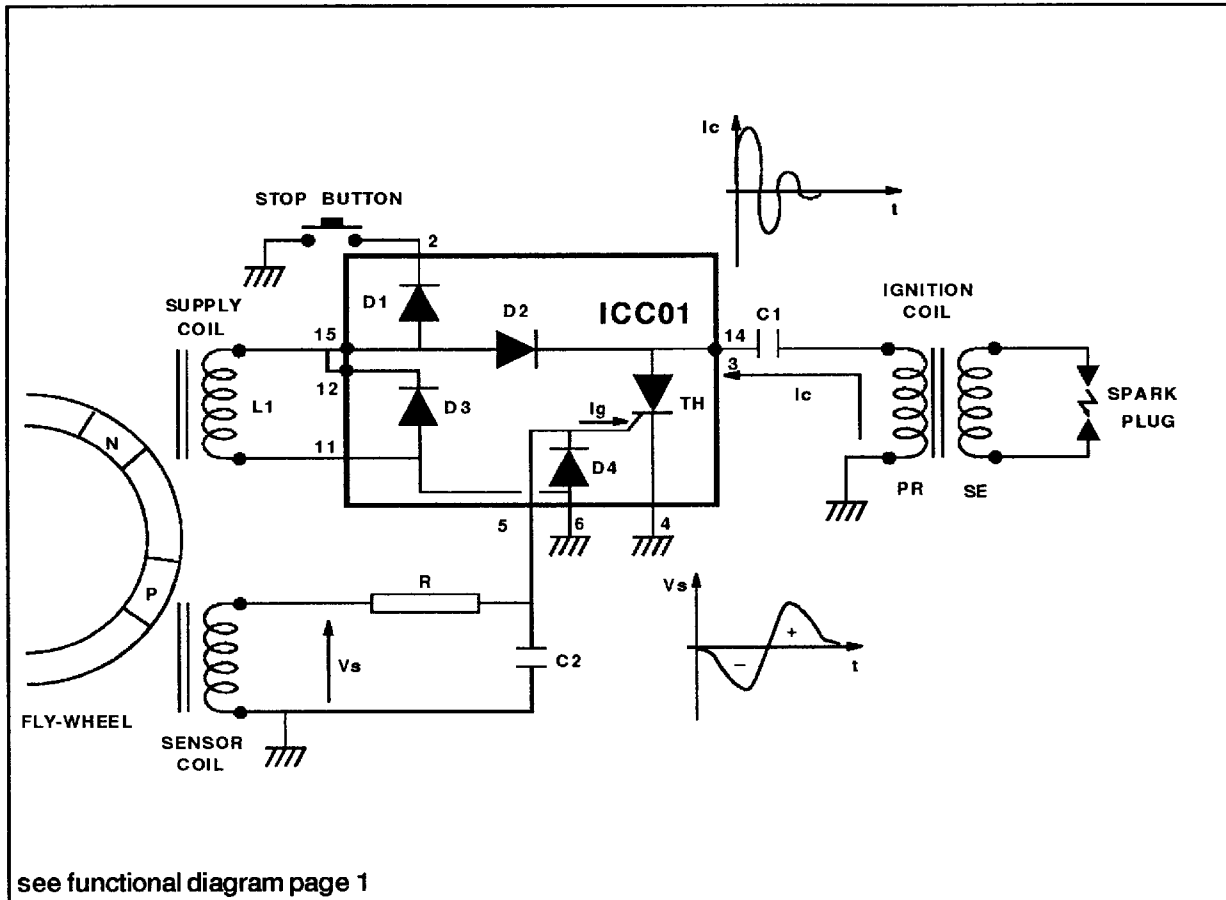


Fig.2 : Safety limitation curve of the capacitor voltage variation versus RPM @  $t_p=20\mu\text{s}$ .



**BASIC APPLICATION**



see functional diagram page 1

The applications using the capacitive ignition system (CDI) operate in 3 phases.

**PHASE 1**

Storage of the energy in the capacitor C1

**PHASE 2**

Discharge of the capacitor C1 and spark generation to the ignition coil.

**PHASE 3**

Engine stop.

**1) ENERGY STORAGE IN C1**

The coil L1 generates an alternative voltage. Its positive part charges the capacitor C1 through the diode D2.

The negative waves are clamped by the diode D3.

**2) SPARK GENERATION**

For each fly-wheel revolution the sensor coil produces a bidirectional pulse Vs and triggers the ignition coil.

The negative sinewave generated is clamped by D4 while the positive sinewave initiates a current Ig through the thyristor gate (Th)

The firing of the SCR causes an alternating discharge current Ic through the capacitor C1.

The positive parts of this current flow in the loop C1, Th and the primary of the ignition coil PR.

The negative parts flow through C1, PR and both diodes D3 and D2.

**3) ENGINE STOP**

The engine stop is obtained by short circuiting the supply coil L1 (stop button). The diode D1 avoids the accidental connection of battery voltage.

**ICC01-400B5**

**R RESISTOR CALCULATION**

The purpose of the resistor R is to limit the current  $I_G$  through the thyristor gate. Its maximum value can be calculated as follow :  
 $R_{max} = (V_{s\ min} - V_{GT\ max}) / 2 I_{GT\ max}$

**PROTECTION AGAINST PARASITIC SPIKES**

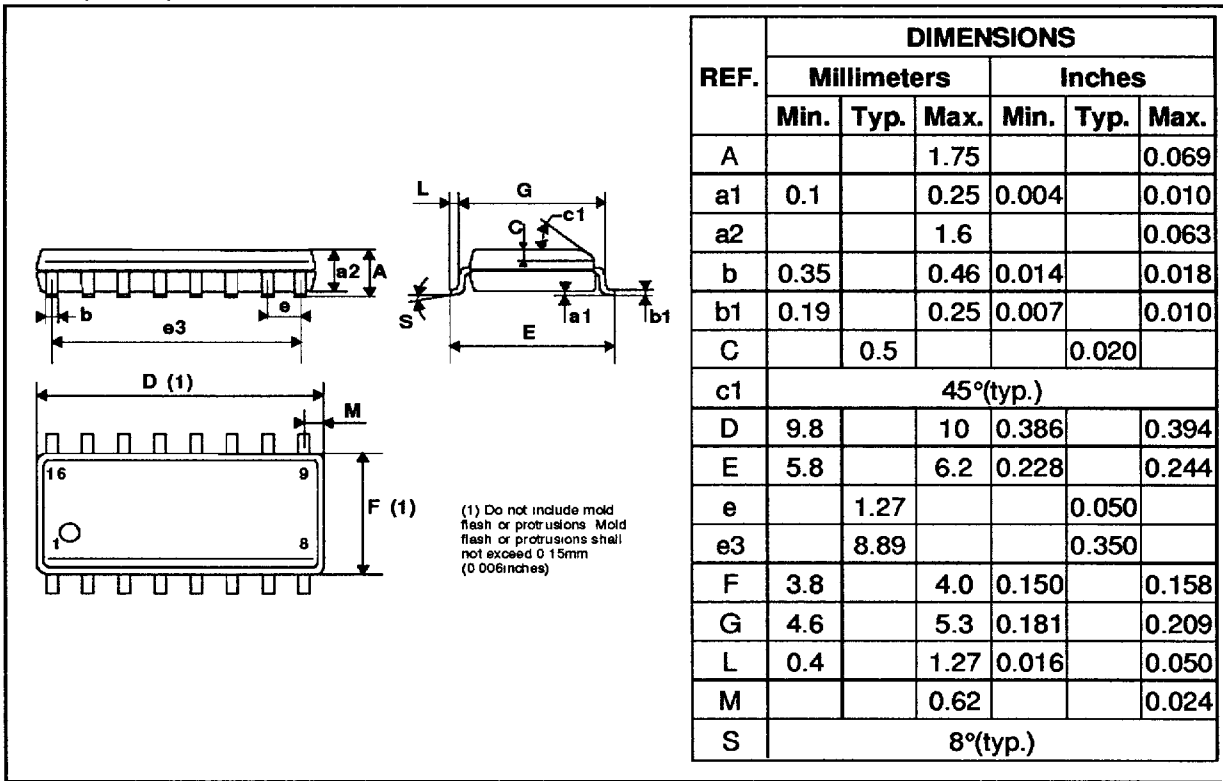
The capacitor C2 in relation with R acts as a filter and avoids the unexpected firing of the thyristor due to parasitic spikes. Good results have been obtained with 10nF capacitance.

**POWER LOSSES (For 20µs - see note 1)**

The following equations can be used to evaluate power losses :

For TH  $V_{TO} = 2.65V$   $R_t = 0.110 \Omega$   
 For D3  $V_{FO} = 1.73V$   $R_d = 0.075 \Omega$

**PACKAGE MECHANICAL DATA**  
 SO16 (Plastic)



Marking : ICC1-400  
 Weight : 0.15 g

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