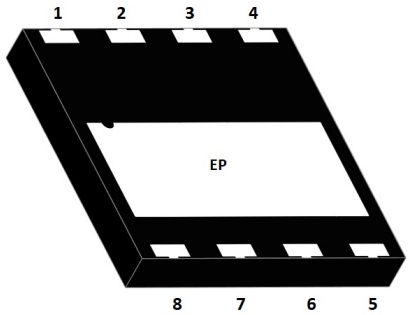
HMHL065N170CI DFN 8x8 Integrated Cascode GaN

Description

HMHL065N170CI is an integrated D-mode Cascode GaN power transistor which possesses benefits of Cascode GaN and modified switching performance. HMHL065N170CI provides high breakdown voltage, high current and high operating speed which is suitable for high power applications.

HMHL065N170CI (DFN 8x8x1.3)



AVDD: 5
RSET: 6
PWM: 7
VDD: 8

Drain: 1, 2, 3, 4
Source: EP

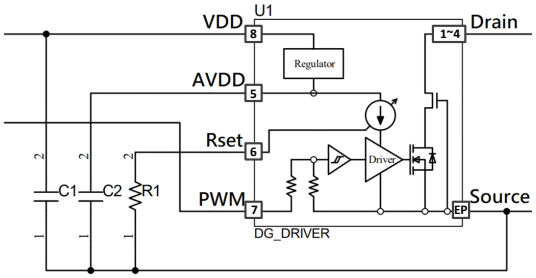
Key Specifications

Part Number	HMHL065N170CI
V_{DSS}, min.	650V
$V_{(TR)DSS}$, min.	800V
$R_{DS(ON)}$, typ.	170mΩ
Package	DFN 8 x 8 mm

Features

- Gate drive voltage compatibility (up to 30V)
- High operating frequency
- Zero reverse recovery loss
- Wide Vcc Range (10V~30V)
- 5 V / 15 V input-compatible
- Programmable turn-on dv/dt
- 1 MHz operation

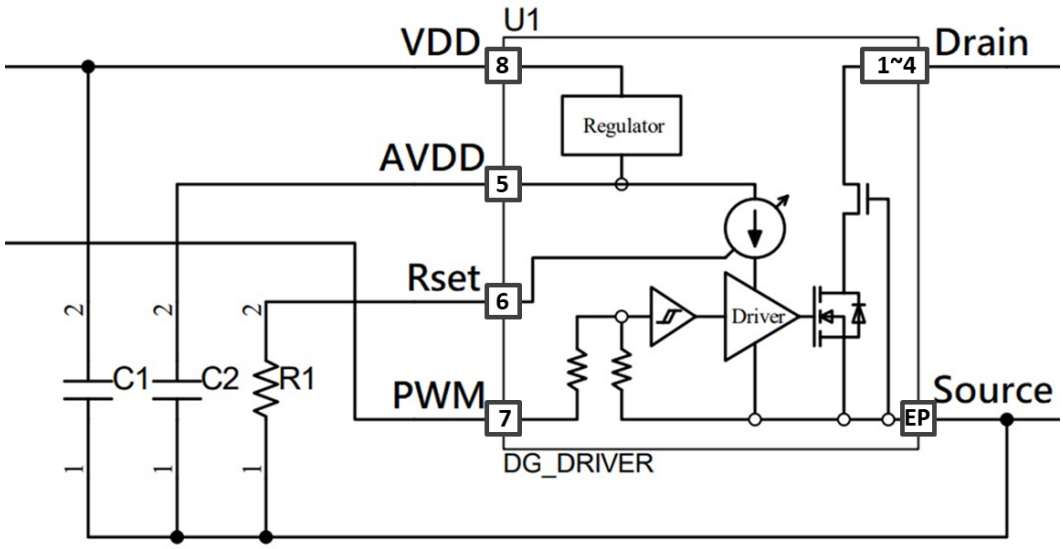
Typical Application Circuit



Applications

- Switch Mode Power Supplies (SMPS)
- AC-DC/ DC-DC Converters
- Motor Drives

1- Pin Description



Pin No.	Symbol	Description
1~4	Drain	Connect to the drain terminal of Cascode GaN
5	AV_{DD}	Gate driver supply voltage.
6	R_{SET}	dv/dt setting pin.
7	PWM	PWM input.
8	V_{DD}/Vin	Supply voltage
EP	Source	Connect to the source terminal of Cascode GaN

2- Electrical Characteristics

➢ Table 1 Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-source voltage	650	V
$V_{(TR)DSS}$	Transient drain to source voltage[a]	800	V
V_{DD}	Supply Voltage	40	V
V_{PWM}	PWM Voltage	30	V
V_{AVDD}	Internal Operating Voltage	7	V
V_{RSET}	Slew rate setting Voltage	7	V
P_{tot}	Total power dissipation @T_C = 25°C	60	W

I_D	Drain current (continuous) at T_C = 25°C operation		8	A
	Drain current (continuous) at T_C = 100°C operation		5	A
I_{DM}	Pulsed drain current (pulse width: 100□s)		13	A
T_c	Operating temperature	Case	-55 to +150	°C
T_J		Junction	-55 to +150	°C
T_S	Storage temperature		-55 to +150	°C
T_{SOLD}	Soldering peak temperature[b]		260	°C

a. In off-state, spike duty cycle D<0.01, spike duration <1□s
b. For 10 sec., 1.6mm from the case

➢ Table 2 Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\Theta JA}$	Thermal resistance junction-ambient	38	°C/W
$R_{\Theta JC}$	Thermal resistance junction-case	2.0	°C/W

➢ Table 3 Electrical Characteristics

Vin=15V, Vds=400V,Fsw=1MHz, Rset=10kΩ，T_{CASE} = 25 °C unless otherwise stated

Symbol	Parameter	Conditions	Values			Unit
			min.	typ.	max.	
$V_{(BL)DSS}$	Drain-source voltage	V_{GS}=0V	650	-	-	V
V_{DD}	VIN Operating Voltage		8		30	V
I_Q	VIN Quiescent Current	V_{PWM}=0V		0.1	0.3	mA
I_Q	VIN Operating Current	F_{SW}= 500kHz, C_{OUT}= 100pF		1	3	mA
V_{AVDD}	Internal Operating Voltage		4.8	5.0	5.2	V
V_{PWMH}	PWM Logic High Threshold				4	V
V_{PWML}	PWM Logic Low Threshold		1			V
V_{PWM_HYS}	PWM Input Logic Hysteresis			3		V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS}=10V, I_D=5A, T_J=25 °C	-	170	240	mΩ
		V_{GS}=10V, I_D=5A, T_J=150 °C	-	330	-	
I_{DSS}	Drain-source leakage current	V_{GS} =0V, V_{DS} =650V, T_J=25°C	-	2.2	12	□A
		V_{GS} =0V, V_{DS} =650V, T_J=150°C	-	100	-	
$t_{D(on)}$	Turn-On Propagation Delay	PWM=0 to 5V	-	15	-	ns
$t_{D(off)}$	Turn-Off Propagation Delay	PWM=0 to 5V	-	25	-	
T_R	Drain Rise Time	PWM=0 to 5V		5		ns
T_F	Drain Fall Time	PWM=0 to 5V		5		ns
F_{SW}	Switching Frequency				1	MHz
t_{PW}	Pulse Width		0.05			us
Q_{RR}	Reverse recovery charge	V_{GS} =-10V, V_{DS} =0V	-		-	nC

Recommended Operating Conditions

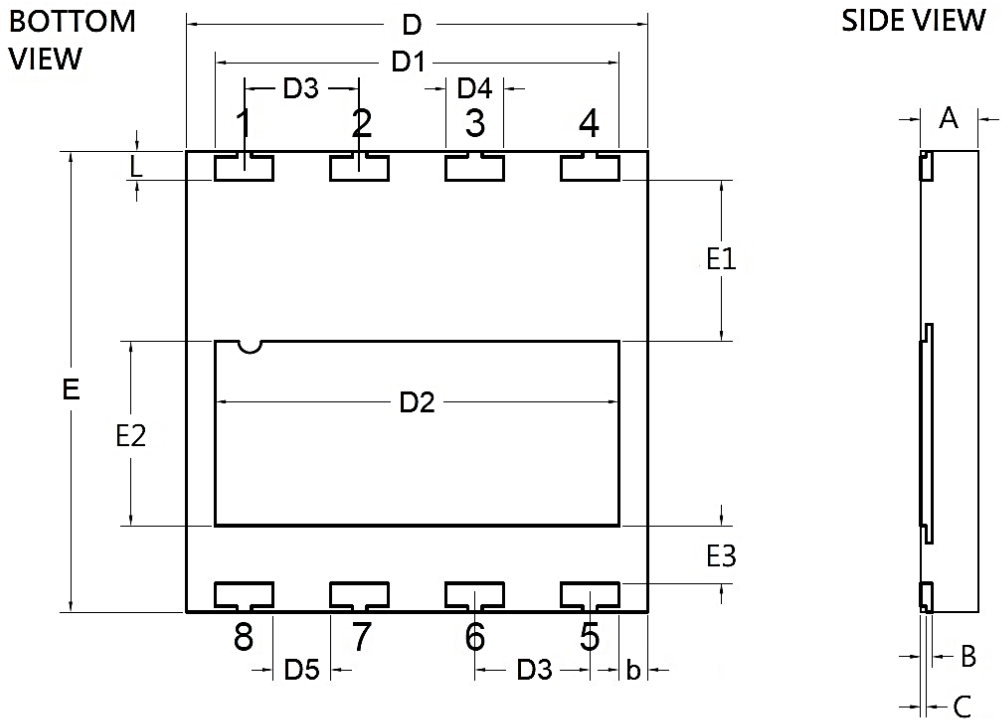
Parameter	Symbol	Value	Unit
Supply Voltage	V_{DD}	10~30	V
PWM Voltage	V_{PWM}	5/15	V
Internal Operating Voltage	V_{AVDD}	5.6	V
Slew rate setting resistor	R_{SET}	10K~100K	Ω
Operating Ambient Temperature	T_{OP}	-40~125	°C

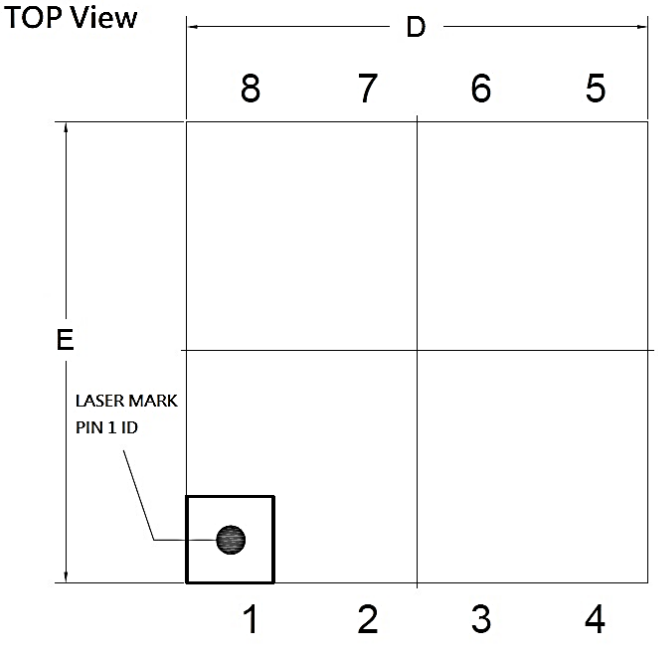
Recommended Component Values

The following table shows the recommended component values for the external C_{VDD}, R_{PWM}, C_{PWM}, C_{AVDD}, and R_{SET}. These components should be placed as close as possible to the power device.

Parameter	Symbol	Min	Typ	Max	Unit
VDD capacitor	CVDD		0.1		uF
VAVDD capacitor	CAVDD		0.022		uF
Gate driver turn-on current set resistor	RSET	10		100	KΩ
PWM filter resistor	RPWM		100		Ω
PWM filter capacitor	CPWM		100		pF

3- Package Outline Dimensions

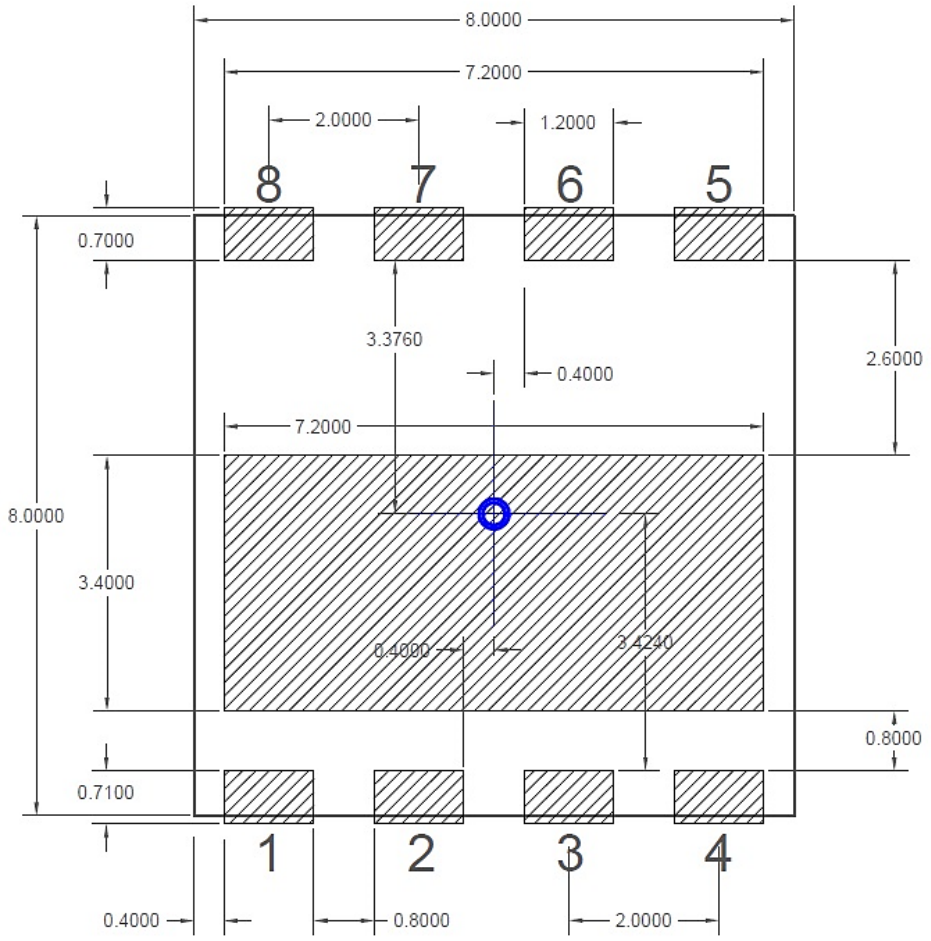




➢ Table 4 Dimension

SYMBOL	DIMENSION (IN MM)			SYMBOL	DIMENSION (IN MM)		
	MINIMUM	MOMINAL	MAXIMUM		MINIMUM	MOMINAL	MAXIMUM
A	1.20	1.30	1.40	-	-	-	-
B	--	0.203	--	-	-	-	-
C	--	0.100	--	-	-	-	-
D	7.90	8.00	8.10	E	7.90	8.00	8.10
D1	6.90	7.00	7.10	E1	2.70	2.80	2.90
D2	6.90	7.00	7.10	E2	3.10	3.20	3.30
D3	2.00 BSC			E3	0.90	1.00	1.10
D4	0.95	1.00	1.05	L	0.40	0.50	0.60
D5	0.95	1.00	1.05	-	-	-	-
b	0.40	0.50	0.60	-	-	-	-

DFN-8X8 Recommended PCB Soldering Footprint



Reflow Soldering Profile