



Battery Disconnect Switch

DESCRIPTION

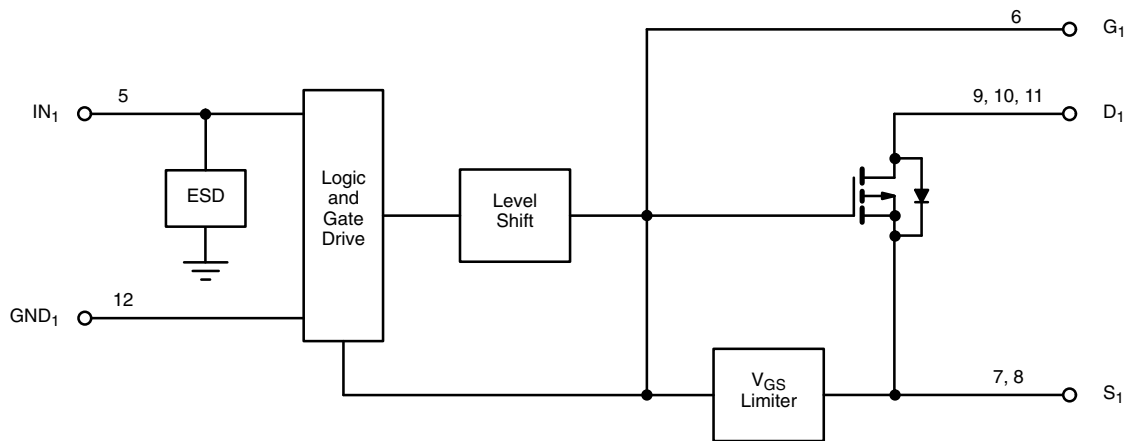
The Si4720CY is two level-shifted P-Channel MOSFETs. Operating together, these MOSFETs can be used as a reverse blocking switch for battery disconnect applications. It is a solution for multiple battery technology designs or designs that require isolation from the power bus during charging.

The Si4720CY is available in a 16-pin SOIC package and is rated for the commercial temperature range of - 25 °C to 85 °C.

FEATURES

- Solution for Bi-Directional Blocking
- 6 V to 30 V Operation
- Ground Referenced Logic Level Inputs
- Integrated Low $R_{DS(on)}$ MOSFET
- Level-Shifted Gate Drive with Internal MOSFET
- Two Independent Inputs
- Ultra Low Power Consumption in Off State (Leakage Current Only)
- Logic Supply Voltage is Not Required

FUNCTIONAL BLOCK DIAGRAM



Half a circuit shown here.

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**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Limit	Unit
Voltage Referenced to GND V_S, V_D^a		- 0.3 to 32	V
V_{SD}		- 0.3 to 30	
V_{IN1}, V_{IN2}		- 0.3 to 15	
V_{GS}		20	
Storage Temperature		- 55 to 150	°C
Power Dissipation ^b	$t = 10$ s	2.5	W
	$t =$ Steady State	1.5	

Notes:

a. $V_{SD} \leq 30 V_{DC}$.

b. Device mounted with all leads soldered to 1" x 1" FR4 with laminated copper PC board.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING RANGE

Parameter	Symbol	Limit	Unit
V_S, V_D		6 to 30	V
V_{IN1}, V_{IN2}		0 to 13.2	
I_{DS}		0 to 6	A
Operating Temperature Range		- 25 to 85	°C
Junction Temperature		- 25 to 150	

This device has a maximum recommended operating junction temperature of 85 °C. This temperature limit is used for electrical specifications such as logic transition voltages only and is not a reliability limit. The device can be used with junction temperatures up to 150 °C if relaxed specifications can be tolerated, although limits for these specifications may not be given. Performance curves can be used to give an indication of specifications at higher temperatures, but are not guaranteed.

SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Otherwise Specified	Limits				Unit
			Temp. ^a	Min. ^b	Typ. ^c	Max. ^b	
On-Resistance	r_{DS}	$V_S = 10$ V, $I_D = 1$ A, $V_{IN} = H$	Room		0.0155	0.020	Ω
Leakage Current	$I_{DS(off)}$	$V_{DS} = 10$ V	Room			1	μ A
Supply Current	$I_{S(off)}$	$V_S = 21$ V	Room			1	
	$I_{S(on)}$		Room		1.1	6	
Input Voltage Low	V_{INL}	$V_S = 10$ and $V_S = 21$	Full			1	V
Input Voltage High	V_{INH}		Full	2.5			
Input Leakage Current	I_{INH}	$V_{IN} = 5$ V	Full			5	μ A
Turn-On Delay	IN to D or S	$V_S = 10$ V, $R_L = 5$ Ω , Figure 1	Room	2.2	2.9	10	μ s
Turn-Off Delay			Room		1.5	2.1	
Break-Before-Make ^d	t_{BBM}		Room		1.05		
Rise Time	t_{RISE}	$V_S = 10$ V, $R_L = 5$ Ω , Figure 1	Room		1.3	2.5	
Fall Time	t_{FALL}		Room		50	100	ns
Voltage Across pin 6 and 7	V_{GS}	$V_S = 30$	Room		10.2	18	V
Forward Diode	V_{SD}	$I_D = -1$ A	Room			1.1	

Notes:

a. Room = 25 °C, full = as determined by the operating temperature suffix.

b. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum.

c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

d. Guaranteed by design, not subject to production testing.



TIMING DIAGRAMS

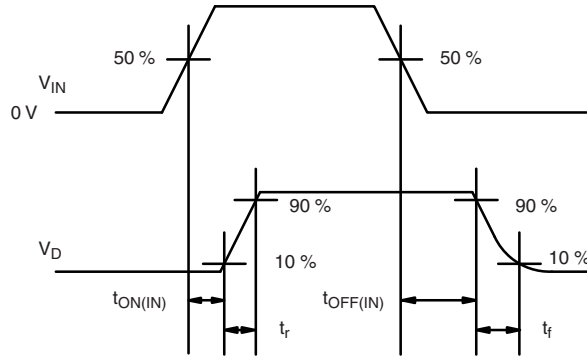
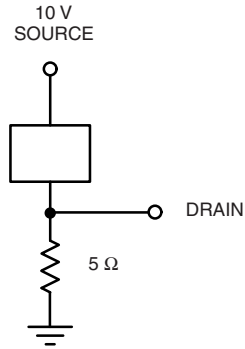
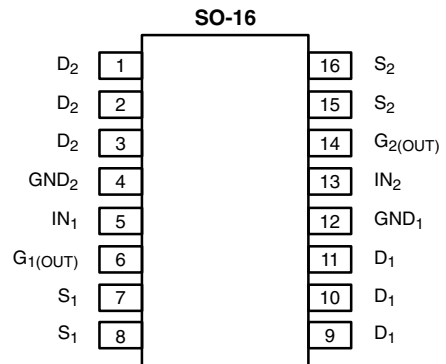


Figure 1.

PIN CONFIGURATION AND TRUTH			
V _{IN1}	V _{IN2}	Switch 1	Switch 2
0	0	Off	Off
0	1	Off	On
1	0	On	Off
1	1	On	On



Top View

Order Number: Si4720CY

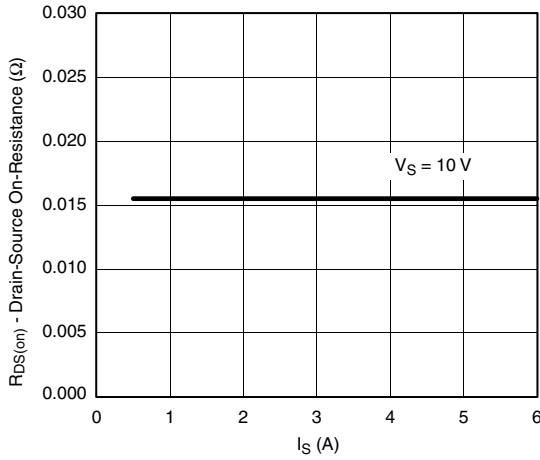
PIN DESCRIPTION (Subject to Change)		
Pin Number	Symbol	Description
1, 2, 3	D ₂	Drain connection for MOSFET-2.
4, 12	GND	Ground
5	IN ₁	Logic input, IN ₁ . High level turns on the switch.
6	G _{1(OUT)}	Gate output to MOSFET-1.
7, 8	S ₁	Source connection for MOSFET-1.
9, 10, 11	D ₁	Drain connection for MOSFET-1.
13	IN ₂	Logic input, IN ₂ . High level turns on the switch.
14	G _{2(OUT)}	Gate output to MOSFET-2.
15, 16	S ₂	Source connection for MOSFET-2.

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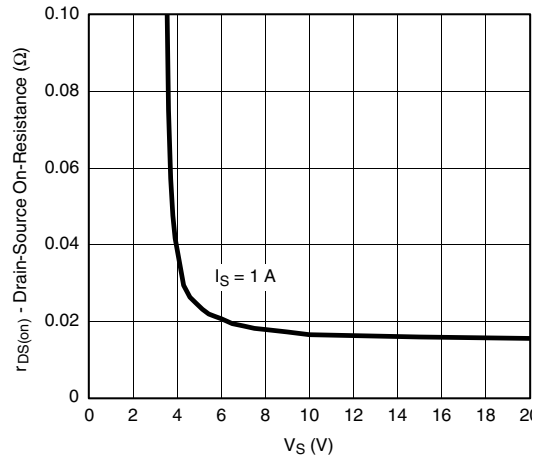


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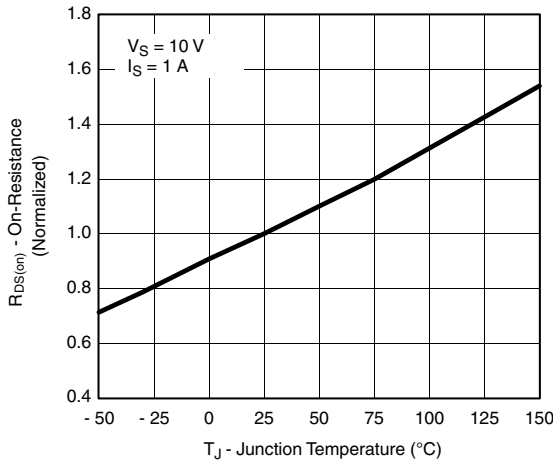
TYPICAL CHARACTERISTICS (25 °C unless noted)



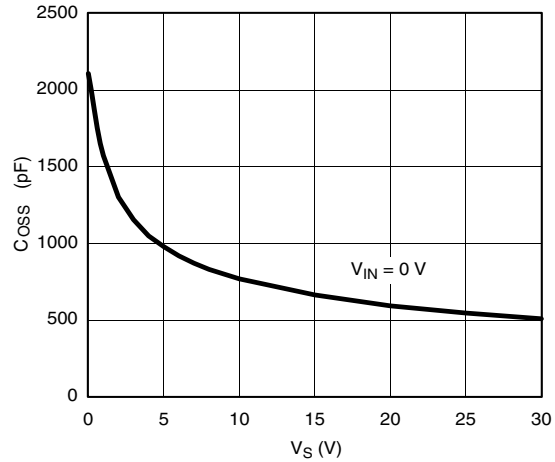
On-Resistance vs. Drain Current



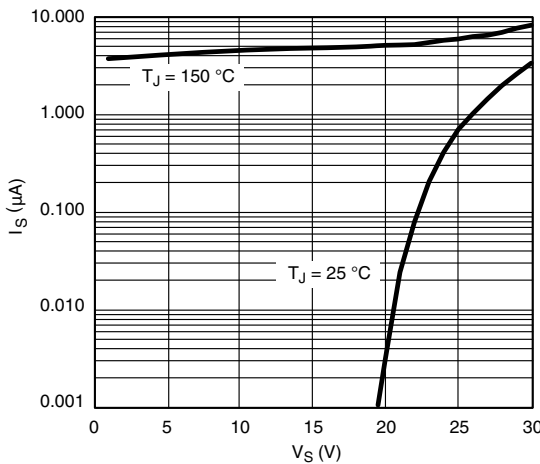
On-Resistance vs. Source Voltage



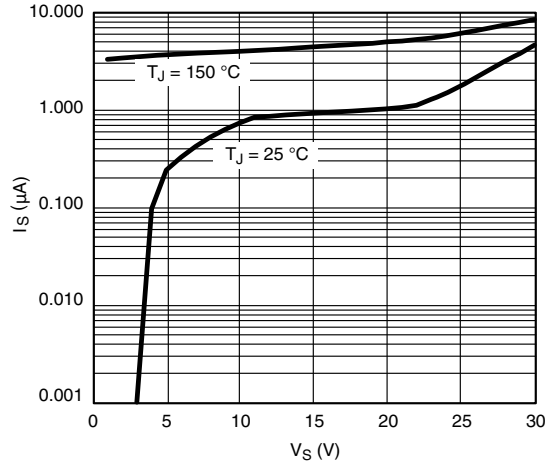
Normalized On-Resistance vs. Junction Temperature



Output Capacitance vs. Source Voltage



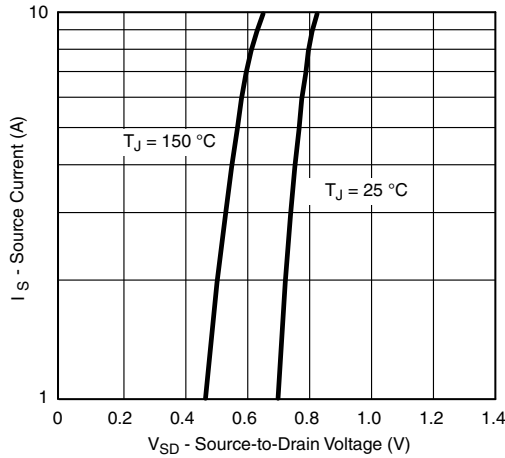
Off-Supply Current vs. Source Voltage



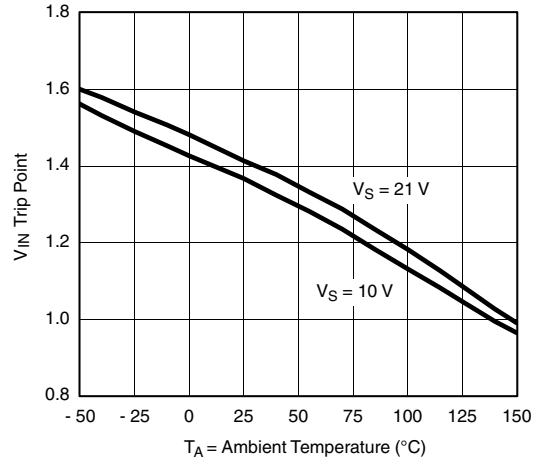
On-Supply Current vs. Source Voltage



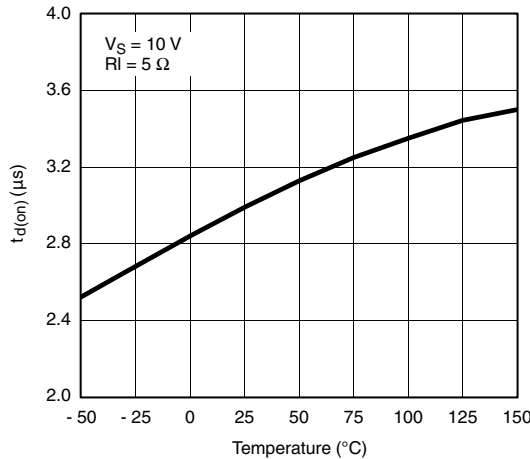
TYPICAL CHARACTERISTICS (25 °C unless noted)



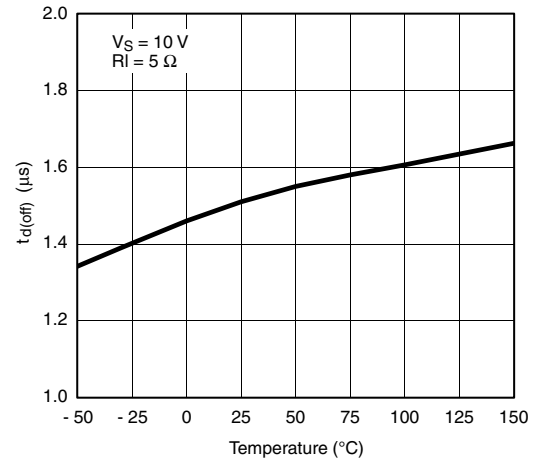
Drain-Source Diode Forward Voltage



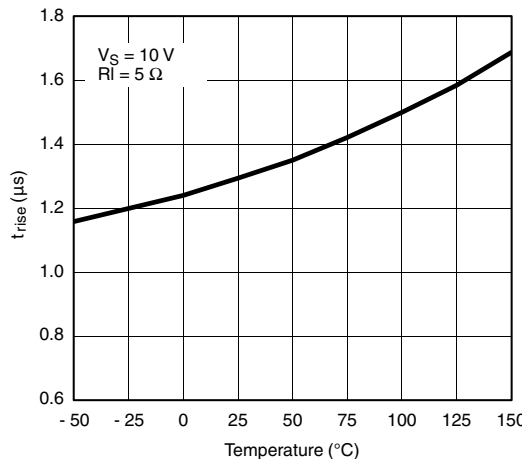
Input Voltage Trip Point vs. Temperature



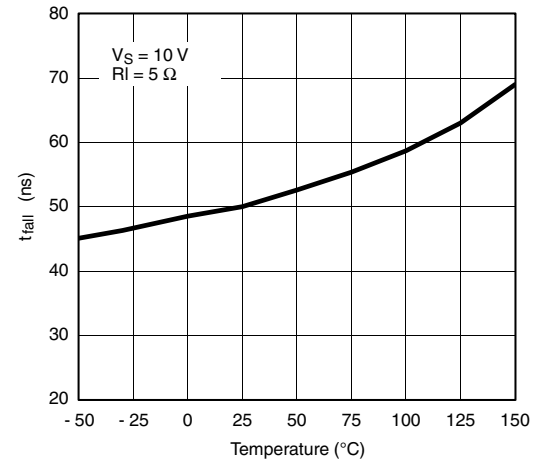
Turn-On Delay vs. Temperature



Turn-off Delay vs. Temperature



Rise Time vs. Temperature



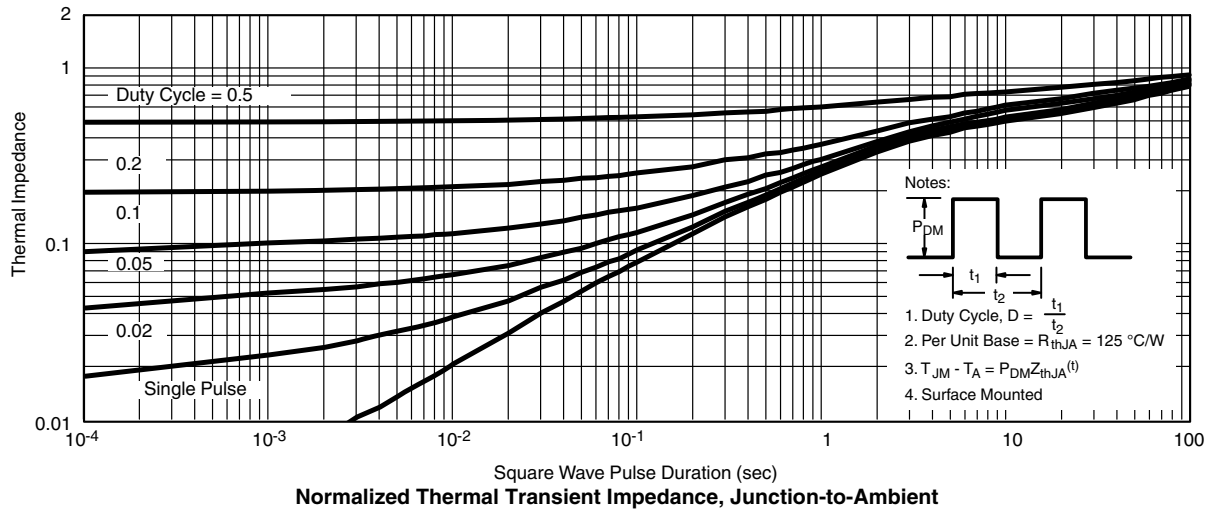
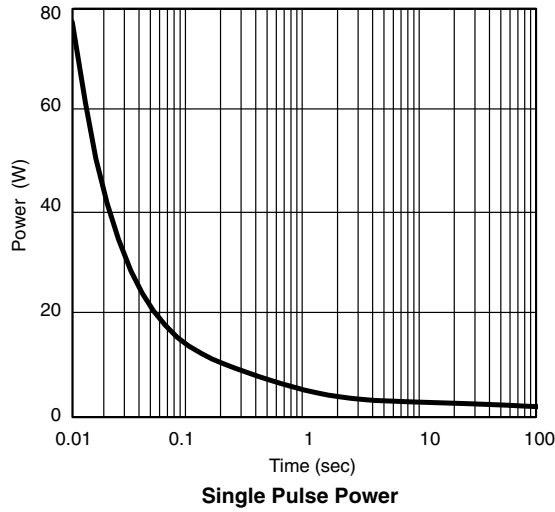
Fall Time vs. Temperature

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TYPICAL CHARACTERISTICS (25 °C unless noted)





APPLICATION DRAWINGS

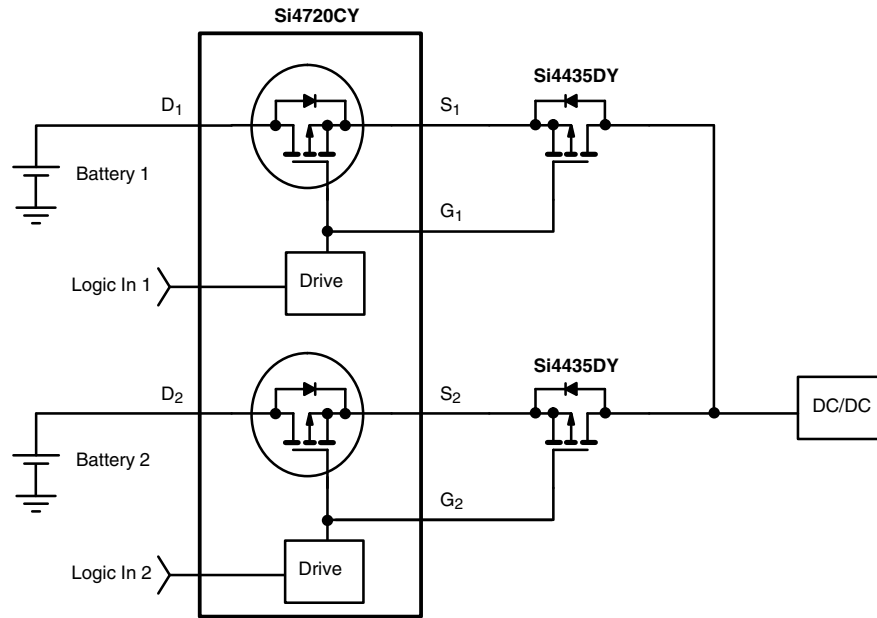


Figure 2.

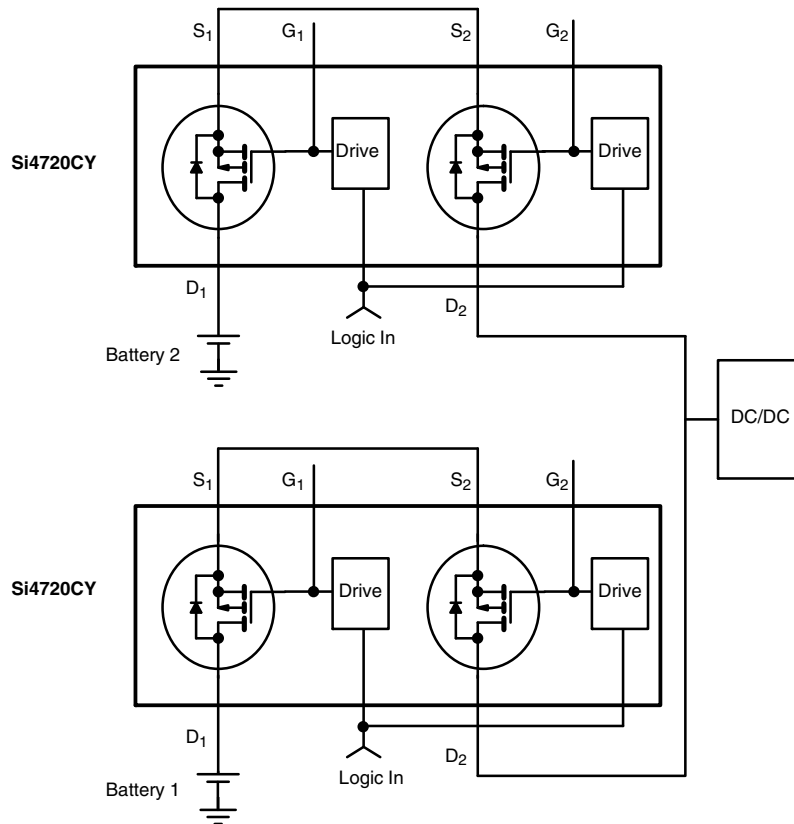


Figure 3.

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APPLICATION DRAWINGS

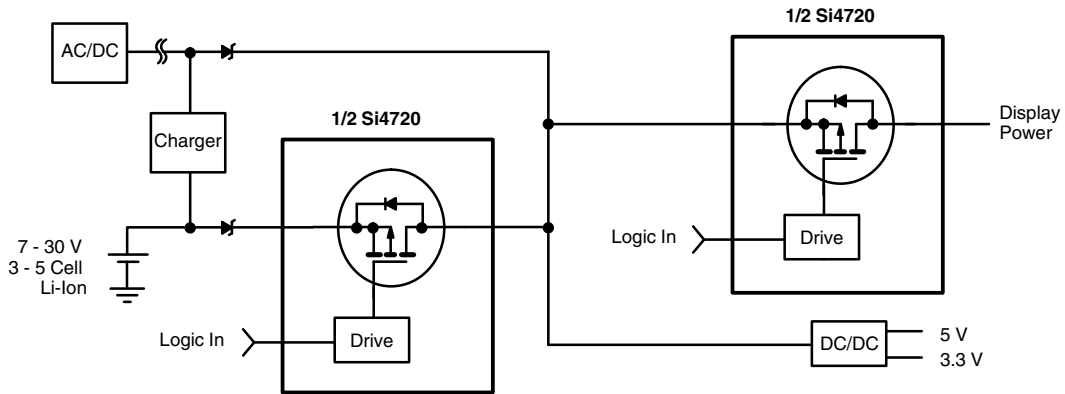


Figure 4. Low-Cost Laptop PC

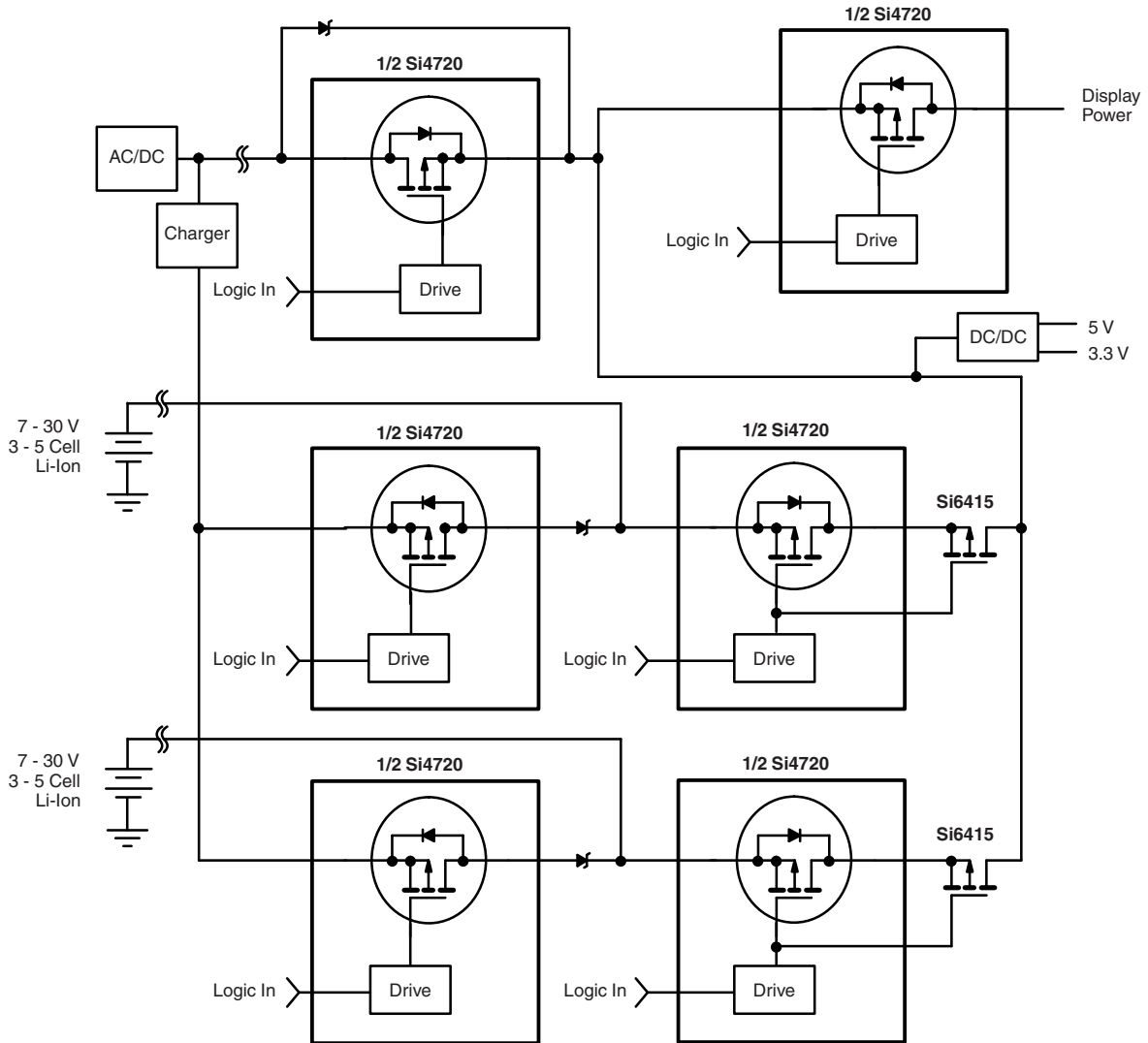


Figure 5. High-Performance Laptop PC

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SOIC (NARROW): 16-LEAD
JEDEC Part Number: MS-012



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.38	0.51	0.015	0.020
C	0.18	0.23	0.007	0.009
D	9.80	10.00	0.385	0.393
E	3.80	4.00	0.149	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
L	0.50	0.93	0.020	0.037
∅	0°	8°	0°	8°

ECN: S-03946—Rev. F, 09-Jul-01
DWG: 5300





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