



Small, efficient, and robust solutions for digital still cameras

NXP discretes for power management, interface, and general-purpose applications



NXP discretes for digital still cameras

Digital still cameras (DSCs) are demanding designs. They are portable, battery-powered systems, so they require components that extend battery life and require very little board space. They also need to deliver quality, reliable performance while supporting increasing levels of sophisticated functionality.

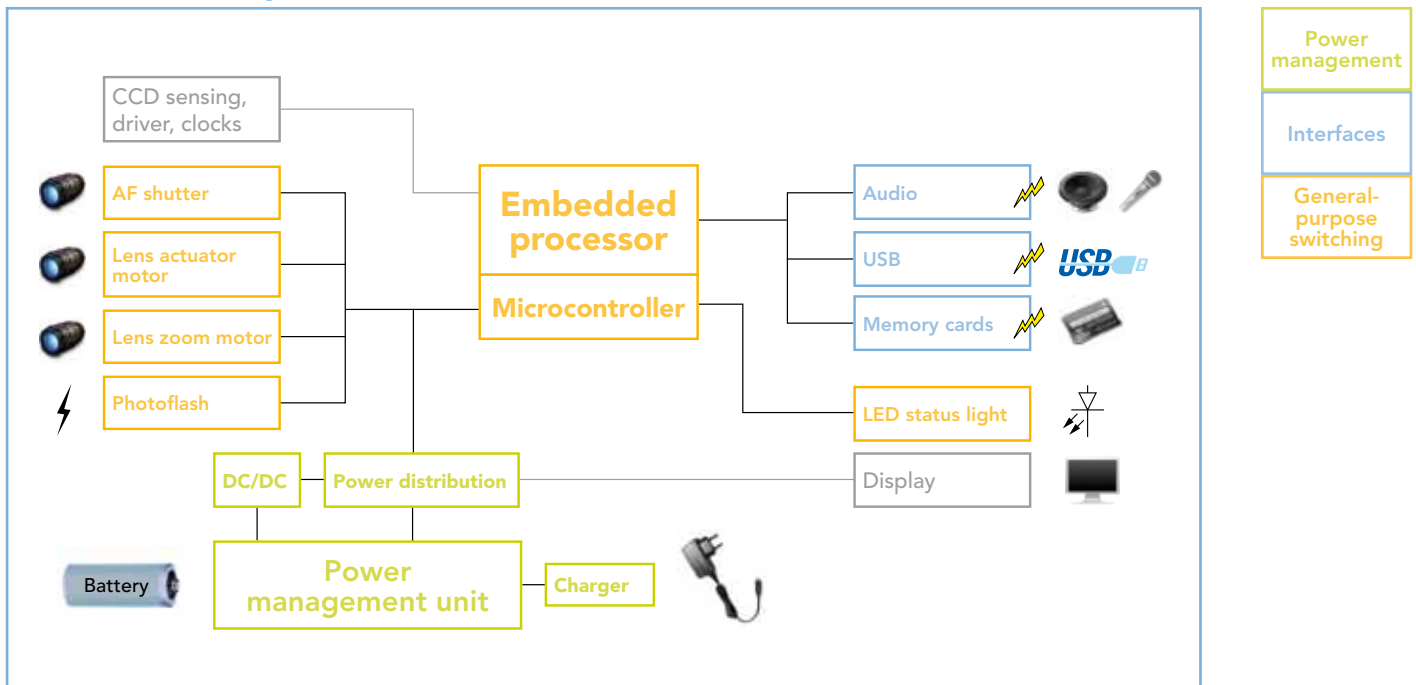
NXP's extensive portfolio of discretes for DSCs provides it all: low power consumption, exceptionally small size, and robust design. With more than 50 years of experience in semiconductors, we are a proven high-volume supplier with the right solutions for every kind of DSC. We address key issues throughout the camera, from power management and photo flash to LED status lights, motor control, interface protection, and general-purpose switching.

This brochure is just the beginning. To learn more about how NXP's discretes can enhance performance of your next DSC design, go to www.nxp.com

Highlights of NXP's discretes portfolio

- ▶ Medium-power low V_F (MEGA) Schottky rectifiers (e.g. 30 V, 1 A)
- ▶ Low V_{CEsat} (BISS) transistors (power management / charger / LCD backlight)
- ▶ Small-signal MOSFETs (general switching, load switch)
- ▶ General-purpose and digital (resistor-equipped) transistors
- ▶ General-purpose switching and Zener diodes

Generic DSC block diagram



Power management

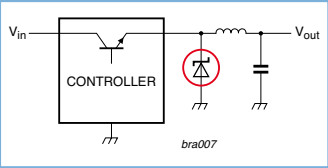
Power management

Interfaces

General-purpose switching

DC/DC conversion and power management

Today's DSCs mainly use a power management unit (PMU) to handle DC power conversion. Switches are typically integrated into the PMU, but freewheeling diodes (Schottky diodes) are often used externally due to low power dissipation and process technology.



PMEG series

► Typical spec: $V_R > 30\text{ V}$, $I_F > 500\text{ mA}$

► Ultra-low forward voltage V_F

► Small SMD packages

System notes

- DSC energy source: 3 or 6 V batteries
 - Average standalone energy consumption: 2 W per flash / 500 mW per LCD view
- Power management system includes multiple DC/DC converters, supply line switches, and control and status logic
 - Different voltages required for image processor, microcontroller, memory (1.8 to 3.3 V), and for CCD image sensor and LCD display (+5, +6.5, +13.5, ±15, or ± 7.5 V)
- Uses power-sequencing circuit



Low V_F (MEGA) Schottky rectifiers

Package					SOD123W	SOD323F (SC-90)	SOD523 (SC-79)
Size (mm)					2.6 x 1.7 x 1.0	1.7 x 1.25 x 0.7	1.2 x 0.8 x 0.6
V_R max (V)	I_F max (A)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Optimization			
30	0.5	430	0.15	low V_F		PMEG3005EJ	
		500	0.5	low V_F			PMEG3005EB
	1.0	360	1.5	low V_F	PMEG3010ER		
		520	0.05	low I_R		PMEG3010CEJ	
		680	0.5	low V_F			PMEG3010EB
40	3.0	540	0.1	low I_R	PMEG4030ER		

Power distribution

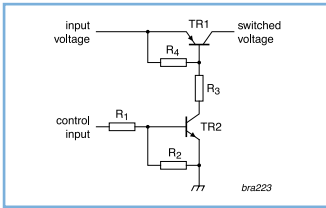
Load switch, supply-line switch

Small-signal bipolar transistors, digital (resistor-equipped) transistors, and MOSFETs (single and double)

Power management

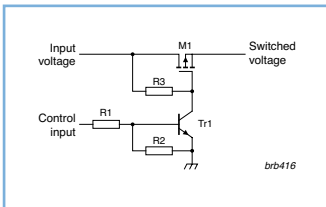
Interfaces

General-purpose switching



Load switch transistor (PNP or P-channel)

- ▶ $V_{CEO} > 12\text{ V}$
- ▶ $I_C > 0.5\text{ A}$
- ▶ Low V_{CEsat} and low R_{DSon} for high efficiency
- ▶ Either BJT with $0.7\text{ V } V_{BE}$ turn-on voltage or low V_{Gsth} MOSFET



Control transistor (NPN)

- ▶ $V_{CEO} > 12\text{ V}$
- ▶ $I_C < 0.1\text{ A}$
- ▶ General-purpose small-signal or digital (resistor-equipped) transistor

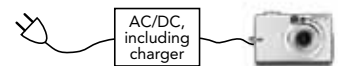
General-purpose load switches and control transistors

Package				SOT23			SOT323 (SC-70)		SOT666	SOT416 (SC-75)
Size (mm)				2.9 x 1.3 x 1.0			2.0 x 1.25 x 0.95		1.6 x 1.2 x 0.55	1.6 x 0.8 x 0.77
V_{CEO} (V)	I_C (A)	R1 (kΩ)	R2 (kΩ)	NPN	PNP	P-Channel	NPN	PNP	NPN/PNP	NPN
Control transistors										
45	0.1	-	-	BC847	BC857		BC847W	BC857W		
50	0.1	4.7	10	PDTC143XT	PDTC143XT		PDTC143XU	PDTC143XU	PEMD18	
	0.15	-	-					2PA1576R		2PC4617R
Load switches										
20	3.9	-	-			PMV65XP				
	1	-	-		PBSS5120T					
40	1	-	-				PBSS4140U			

Li-ion battery charger

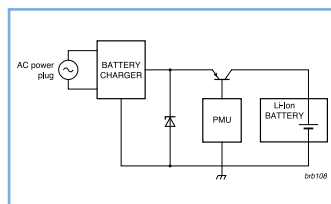
DSC battery charging

- ▶ Usually takes place outside the camera
- ▶ Charging sockets for cameras or external Li-ion battery charger



Medium-power standard bipolar and low V_{CEsat} transistors

- ▶ Reverse blocking function: no additional Schottky diode required
- ▶ High and stable current gain: direct drive from a microcontroller
- ▶ Low turn-on voltage: efficient at low-voltage portable applications
- ▶ Low saturation-voltage drop: $< 40\text{ mV } V_{CEsat}$ at I_C current of 1 A



PNP medium power transistor

- ▶ $V_{CEO} > V_{out}$
- ▶ $I_C \text{ max} = 1 \text{ to } 4\text{ A}$
- ▶ Linear controller requires good heat transfer

Medium-power transistors

Package	SOT89 (SC-62)	SOT457 (SC-74)	SOT1061
Size (mm)	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.0 x 2.0 x 0.65
V_{CEO} (V)	I_C (A)		
20	1.0	BC869	
	5.0	PBSS5520X	
40	4.0	PBSS302PD	
60	5.0		PBSS5560PA

Interfaces

Power management

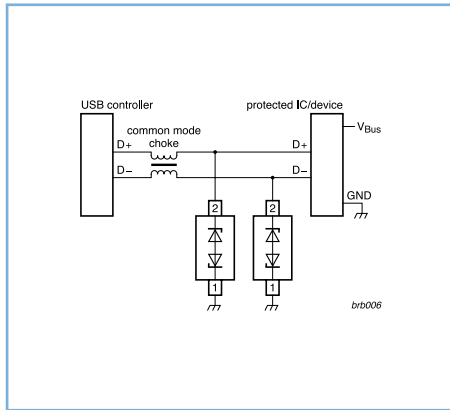
Interfaces

General-purpose switching

USB interface

Protection against ESD on D+, D- and V_{BUS}

C_{line} critical for high-speed data transfer (480 Mbits/sec)

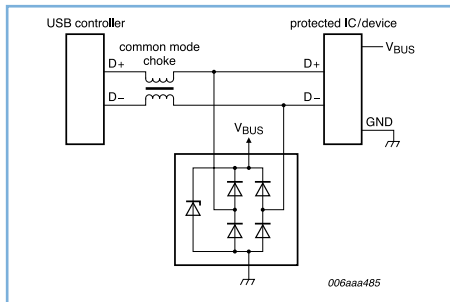


PESD5V0X1BL (datalogs)

- ▶ $V_{RWM} \leq 5 \text{ V}$
- ▶ Low $C_d \leq 1 \text{ pF}$
- ▶ Single line, bidirectional protection
- ▶ SOD882

PESD12VS1UL (V_{BUS})

- ▶ $V_{RWM} \leq 12 \text{ V}$
- ▶ Single line, unidirectional protection
- ▶ SOD882



PRTR5V0U2F (datalogs + V_{BUS})

- ▶ $V_{RWM} \leq 5 \text{ V}$
- ▶ Low $C_d \leq 1 \text{ pF}$
- ▶ Optimized routing, bidirectional protection
- ▶ One device protects D-, D+ and V_{BUS} (5 V)
- ▶ Ultra-small SOT886 and SOT891 packages

USB ESD protection diodes

Package		SOT886 (XSON6)	SOD882
Size (mm)		1.45 x 1.0 x 0.5	1.0 x 0.6 x 0.5
Number of protected lines	C_{line} (pF)		
1	12		PESD12VS1UL
	35		PESD5V0S1BL
2	1	PRTR5V0U2F	

Eye diagram



Analog audio and memory card

Analog audio ESD protection diodes

Package		SOT23	SOD882
Size (mm)		2.9 x 1.3 x 1.0	1.0 x 0.6 x 0.5
Number of protected lines	C_{line} (pF)		
1	35	PESD5V0S2BT	PESD5V0S1BL

Memory card ESD protection diodes

Package		SOT665
Size (mm)		1.6 x 1.2 x 0.55
Number of protected lines	C_{line} (pF)	
2	16	PESD5V0L4UW
	12	PESD5V0V4UW

General-purpose and switching devices

Power management

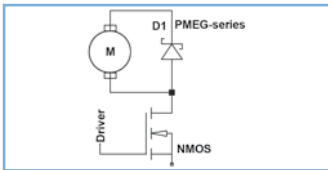
Interfaces

General-purpose switching

Motor control

Low V_F (MEGA) Schottky rectifier in motor control circuit (freewheeling diode)

- PMEG3020BER (low I_R), PMEG3020ER (low V_F)



PMEG3020BER

- 30 V / 2 A Schottky diode
- low I_R
- SOD123W

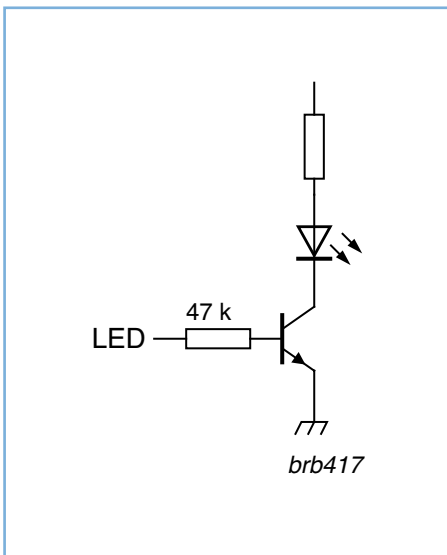
Switching, audio line mute circuits, TV detect, etc.

- Small-signal MOSFETs: 2N7002, PMV65XP
- Small-signal transistors: 2PC4617, BC8x7, PMBT390x, PEMxx-series
- Digital (resistor-equipped) transistors: PDTA, PDTD, PEMxx series
- Diodes: BAS516, BAV70, BZX series



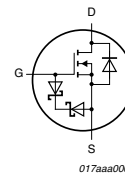
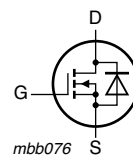
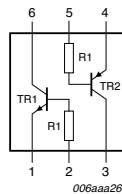
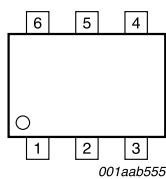
Status LED

General-purpose, switching and digital (resistor-equipped) transistors (double or single configuration, various packages)



PDTx, PEM series

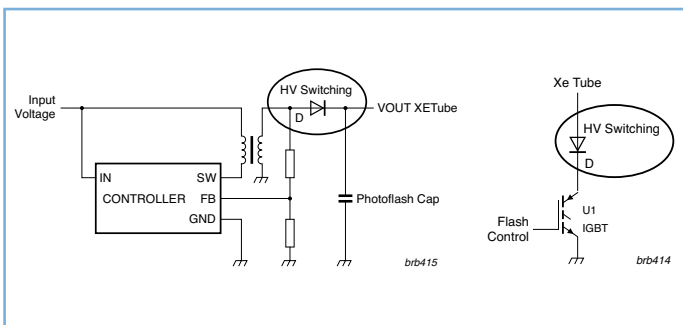
- NPN
- $I_C \leq 100 \text{ mA}$, $V_{CEO} \leq 45 \text{ V}$
- SOT23, SOT323, SOT363, SOT666



2N7002

- N-channel small-signal MOSFET, $V_{DS} \leq 60 \text{ V}$
- ESD, non-ESD protected
- SOT23

Photo flash unit



Planned 400 V switching diodes

- SOD323 and SOD123

NXP is a proven high-volume commodity supplier with a wide package range and over 50 years experience in semiconductors.

Discretes for digital still cameras

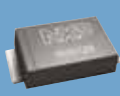
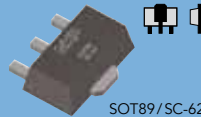
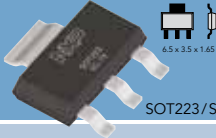
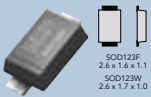
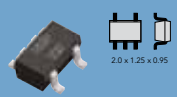
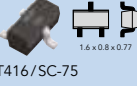
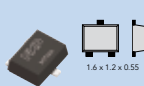
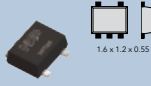
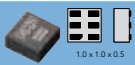
Diodes

	Schottky diodes		Switching diodes		Zener diodes		Protection diodes	
Charger	PMEG3020ER	SOD123W					PTVS12VS1UR	SOD123W
	PMEG2010EH	SOD123F						
Zoom / lens	PMEG3020ER	SOD123W						
	PMEG4020ER	SOD123W						
USB interface							PTR5V0U2F	SOT886
							PESD5V0S1BL	SOD882
							PESD12VS1UL	SOD882
Peripherals	BAT54	SOT23	BAV99	SOT23				
	1PS79SB30	SOD523(SC79)	BAS516	SOD523(SC79)				
	1PS75SB45	SOT416(SC75)	1PS301	SOT323(SC70)				
			BAW56	SOT23				
Display	PMEG3002AEL	SOD882						
Flash	dual series Schottky in Dev		400 V - 800 V in Dev					
Power management / load switch / DC/DC	PMEG3005EJ	SOD323F			PZU7.5B	SOD323F		
	PMEG3010CEJ	SOD323F			PZU15B	SOD323F		
	PMEG3005EB	SOD523						
	PMEG3010EB	SOD523						
	PMEG3010ER	SOD123W						

Transistors

	General-purpose / digital transistors / Low V _{CEsat} transistors		MOSFETs		Small-scale integrated transistors & diodes	
Charger	PBSS302PD	SOT457(SC74)	PMV65XP	SOT23		
	PBSS5220X	SOT89(SC62)				
	BC869	SOT89(SC62)				
	PBSS5560PA	SOT1061				
Backlight / LED status / general-purpose	PDTC1xxTT	SOT23			PBLS15xxV	
	PDTC1xxTU	SOT323(SC70)			PBLS-40xxV	
	PDTA1xx1TT	SOT23				
	PDTA1xxTU	SOT323(SC70)				
	2PC4617R	SOT416(SC75)				
	BC847	SOT23				
Power management / load switch / DC/DC	PDTC series	all 3- and 6- pin	PMV65XP	SOT23	PBLS15xxV	SOT666
	PDTA series	all 3- and 6- pin	PMV50XP	SOT457(SC74)	PBLS-40xxV	SOT666
	PEMD18 / PEMZ1	SOT666	BSS84	SOT23		
	2PA1576R	SOT323(SC70)	BSH103	SOT23		
	2PC4617R	SOT416(SC75)	2N7002	SOT23		
	BC8x7	SOT416(SC75)	PMGD8000LN	SOT363(SC88)		

Wide range of SMD packages

Medium-power	 SOD128 3.8 x 2.6 x 1.0	 SOT89/SC-62 2.9 x 1.3 x 1.0	 SOT223/SC-73 6.5 x 3.5 x 1.65	 SOT873/HVSON8 3.3 x 3.3 x 0.85		
Small	 SOD123F 2.6 x 1.6 x 1.1	 SOD123W 2.6 x 1.7 x 1.0	 SOT23 2.0 x 2.0 x 0.65	 SOT143B 2.9 x 1.3 x 1.0	 SOT457/SC-74 2.9 x 1.5 x 1.0	
Very small	 SOD323/SC-76 1.7 x 1.25 x 0.95	 SOD323F/SC-90 1.7 x 1.25 x 0.7	 SOT23 2.0 x 1.25 x 0.95	 SOT353/SC-88A 2.0 x 1.25 x 0.95	 SOT457/SC-74 2.0 x 1.25 x 0.95	
Ultra-small	 SOD523/SC-79 1.2 x 0.8 x 0.6	 SOT416/SC-75 1.6 x 0.8 x 0.77	 SOT663 1.6 x 1.2 x 0.55	 SOT665 1.6 x 1.2 x 0.55	 SOT666 1.6 x 1.2 x 0.55	
Ultra-small	 SOD882 1.0 x 0.6 x 0.5	 SOT883/SC-101 1.0 x 0.6 x 0.5		 SOT886/XSON6 1.45 x 1.0 x 0.5	 SOT891/XSON6 1.0 x 1.0 x 0.5	
All sizes in mm (length x width x height)	2-lead		3-lead		4/5/6-lead	



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