

Multichemistry Battery Chargers with Automatic System Power Selector

ABSOLUTE MAXIMUM RATINGS

DCIN, CSSP, CSSN, SRC, ACOK to GND.....-0.3V to +30V
 DHIVSRC + 0.3, SRC - 6V
 DHI, PDL, PDS to GND-0.3V to (V_{SRC} + 0.3)
 BATT, CSIP, CSIN to GND-0.3V to +20V
 CSIP to CSIN or CSSP to CSSN or PGND to GND ...-0.3V to +0.3V
 CCI, CCS, CCV, DLO, IINP, REF,
 ACIN to GND-0.3V to (V_{LDO} + 0.3V)
 DLOV, VCTL, ICTL, MODE, CLS, LDO,
 PKPRES to GND-0.3V to +6V

DLOV to LDO.....-0.3V to +0.3V
 DLO to PGND-0.3V to (DLOV + 0.3V)
 LDO Short-Circuit Current.....50mA
 Continuous Power Dissipation (T_A = +70°C)
 28-Pin TQFN (derate 20.8mW/°C above +70°C)1666mW
 Operating Temperature Range-40°C to +85°C
 Junction Temperature+150°C
 Storage Temperature Range-60°C to +150°C
 Lead Temperature (soldering, 10s)+300°C

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.

ELECTRICAL CHARACTERISTICS

(Circuit of Figure 1, V_{DCIN} = V_{CSSP} = V_{CSSN} = 18V, V_{BATT} = V_{CSIP} = V_{CSIN} = 12V, V_{VCTL} = V_{ICTL} = 1.8V, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, T_A = 0°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
CHARGE VOLTAGE REGULATION						
VCTL Range			0		3.6	V
Battery Regulation Voltage Accuracy		V _{VCTL} = 3.6V (3 or 4 cells); not including VCTL resistor tolerances	-0.8		+0.8	%
		V _{VCTL} = 3.6V/20 (3 or 4 cells); not including VCTL resistor tolerances	-0.8		+0.8	
		V _{VCTL} = 3.6V (3 or 4 cells); including VCTL resistor tolerances of 1%	-1.0		+1.0	
		V _{VCTL} = V _{LDO} (3 or 4 cells, default threshold of 4.2V/cell)	-0.5		+0.5	
VVCTL Default Threshold		V _{VCTL} rising	4.1		4.3	V
VCTL Input Bias Current		V _{VCTL} = 3V	0		2.5	μA
		V _{DCIN} = 0, V _{VCTL} = 5V	0		12	
CHARGE-CURRENT REGULATION						
ICTL Range		MAX1909	0		3.6	V
		MAX8725	0		3.2	
CSIP-to-CSIN Full-Scale Current-Sense Voltage			69.37	75.00	80.63	mV
Charge-Current Accuracy		MAX1909: V _{ICTL} = 3.6V (not including ICTL resistor tolerances)	-7.5		+7.5	%
		MAX8725: V _{ICTL} = 3.2V (not including ICTL resistor tolerances)	-5		+5	
		MAX1909: V _{ICTL} = 3.6V x 0.5, MAX8725: V _{ICTL} = 3.2V x 0.5 (not including ICTL resistor tolerances)	-5		+5	
		MAX1909: V _{ICTL} = 0.9V (not including ICTL resistor tolerances)	-7.5		+7.5	
		MAX8725: V _{ICTL} = 0.18V (not including ICTL resistor tolerances)	-30		+30	

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MAX1909/MAX8725

ELECTRICAL CHARACTERISTICS (continued)

(Circuit of Figure 1, $V_{DCIN} = V_{CSSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, $T_A = 0^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Charge-Current Accuracy		MAX1909: $V_{ICTL} = 3.6V \times 0.5$, MAX8725: $V_{ICTL} = 3.2V \times 0.5$ (including ICTL resistor tolerances of 1%)	-7.0		+7.0	%
		$V_{ICTL} = V_{LDO}$ (default threshold of 45mV)	-5		+5	
V_{ICTL} Default Threshold		V_{ICTL} rising	4.1	4.2	4.3	V
BATT/CSIP/CSIN Input Voltage Range			0		19	V
CSIP/CSIN Input Current		Charging enabled		350	650	μA
		Charging disabled; $V_{DCIN} = 0$ or $V_{ICTL} = 0$		0.1	1	
ICTL Power-Down Mode Threshold Voltage		MAX1909			0.75	V
		MAX8725			0.06	
ICTL Power-Up Mode Threshold Voltage		MAX1909	0.85			V
		MAX8725	0.11			
ICTL Input Bias Current		$V_{ICTL} = 3V$	-1		+1	μA
		$V_{DCIN} = 0V$, $V_{ICTL} = 5V$	-1		+1	
INPUT CURRENT REGULATION						
CSSP-to-CSSN Full-Scale Current-Sense Voltage			72.75	75.00	77.25	mV
Input Current-Limit Accuracy		$V_{CLS} = REF$	-3		+3	%
		$V_{CLS} = REF \times 0.75$	-3		+3	
		$V_{CLS} = REF \times 0.5$	-4		+4	
CSSP/CSSN Input Voltage Range			8.0		28	V
CSSP/CSSN Input Current		$V_{CSSP} = V_{CSSN} = V_{DCIN} > 8.0V$		450	730	μA
		$V_{DCIN} = 0$		0.1	1	
CLS Input Range			1.6		REF	V
CLS Input Bias Current		$V_{CLS} = 2.0V$	-1		+1	μA
IINP Transconductance		$V_{CSSP} - V_{CSSN} = 56mV$	2.7	3.0	3.3	mA/V
IINP Accuracy		$V_{CSSP} - V_{CSSN} = 75mV$, terminated with $10k\Omega$	-7.5		+7.5	%
		$V_{CSSP} - V_{CSSN} = 56mV$, terminated with $10k\Omega$	-5		+5	
		$V_{CSSP} - V_{CSSN} = 20mV$, terminated with $10k\Omega$	-10		+10	
IINP Output Current		$V_{CSSP} - V_{CSSN} = 150mV$, $V_{IINP} = 0V$	350			μA
IINP Output Voltage		$V_{CSSP} - V_{CSSN} = 150mV$, $V_{IINP} = float$	3.5			V

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ELECTRICAL CHARACTERISTICS (continued)

(Circuit of Figure 1, $V_{DCIN} = V_{CSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, $MODE = float$, $ACIN = 0$, $CLS = REF$, $GND = PGND = 0$, $PKPRES = GND$, $LDO = DLOV$, $T_A = 0^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY AND LINEAR REGULATOR						
DCIN Input Voltage Range	V_{DCIN}		8.0		28	V
DCIN Undervoltage-Lockout Trip Point		DCIN falling	7	7.4		V
		DCIN rising		7.5	7.85	
DCIN Quiescent Current	I_{DCIN}	$8.0V < V_{DCIN} < 28V$		2.7	6	mA
BATT Input Current	I_{BATT}	$V_{BATT} = 19V$, $V_{DCIN} = 0V$, or $ICTL = 0V$		0.1	1	μA
		$V_{BATT} = 16.8V$, $V_{DCIN} = 19V$, $ICTL = 0V$		0.1	1	
		$V_{BATT} = 2V$ to $19V$, $V_{DCIN} > V_{BATT} + 0.3V$		200	500	
LDO Output Voltage		$8.0V < V_{DCIN} < 28V$, no load	5.25	5.4	5.55	V
LDO Load Regulation		$0 < I_{LDO} < 10mA$		80	115	mV
LDO Undervoltage-Lockout Trip Point		$V_{DCIN} = 8.0V$	3.20	4	5.15	V
REFERENCE						
REF Output Voltage	Ref	$0 < I_{REF} < 500\mu A$	4.2023	4.2235	4.2447	V
REF Undervoltage-Lockout Trip Point		REF falling		3.1	3.9	V
TRIP POINTS						
BATT POWER_FAIL Threshold		$V_{DCIN} - V_{BATT}$, V_{DCIN} falling	50	100	150	mV
BATT POWER_FAIL Threshold Hysteresis			100	200	300	mV
ACIN Threshold		ACIN rising	2.007	2.048	2.089	V
ACIN Threshold Hysteresis			10	20	30	mV
ACIN Input Bias Current		$V_{ACIN} = 2.048V$	-1		+1	μA
SWITCHING REGULATOR						
DHI Off-Time		$V_{BATT} = 16.0V$, $V_{DCIN} = 19V$, $V_{MODE} = 3.6V$	360	400	440	ns
DHI Minimum Off-Time		$V_{BATT} = 16.0V$, $V_{DCIN} = 17V$, $V_{MODE} = 3.6V$	260	300	350	ns
DLOV Supply Current	I_{DLOV}	DLO low		5	10	μA
Sense Voltage for Minimum Discontinuous Mode Ripple Current				7.5		mV
Cycle-by-Cycle Current-Limit Sense Voltage				97		mV
Sense Voltage for Battery Undervoltage Charge Current		MAX1909 only, BATT = 3.0V per cell	3	4.5	6	mV
Battery Undervoltage Threshold		MAX1909 only, MODE = float (3 cell), V_{BATT} rising	9.18		9.42	V
		MAX1909 only, MODE = LDO (4 cell), V_{BATT} rising	12.235		12.565	
DHIV Output Voltage		With respect to SRC	-4.5	-5.0	-5.5	V

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MAX1909/MAX8725

ELECTRICAL CHARACTERISTICS (continued)

(Circuit of Figure 1, $V_{DCIN} = V_{CSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, $T_A = 0^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DHIV Sink Current			10			mA
DHI On-Resistance Low		DHI = V_{DHIV} , $I_{DHI} = -10mA$		2	5	Ω
DHI On-Resistance High		DHI = V_{CSSN} , $I_{DHI} = 10mA$		2	4	Ω
DLO On-Resistance High		$V_{DLOV} = 4.5V$, $I_{DLO} = +100mA$		3	7	Ω
DLO On-Resistance Low		$V_{DLOV} = 4.5V$, $I_{DLO} = -100mA$		1	3	Ω
ERROR AMPLIFIERS						
GMV Loop Transconductance		$V_{CTL} = 3.6V$, $V_{BATT} = 16.8V$, MODE = LDO	0.0625	0.125	0.2500	mA/V
		$V_{CTL} = 3.6V$, $V_{BATT} = 12.6V$, MODE = FLOAT	0.0833	0.167	0.3330	
GMI Loop Transconductance		MAX1909: $I_{CTL} = 3.6V$, MAX8725: $V_{ICTL} = 3.2V$, $V_{CSP} - V_{CSIN} = 75mV$	0.5	1	2	mA/V
GMS Loop Transconductance		$V_{CLS} = 2.048V$, $V_{CSP} - V_{CSSN} = 75mV$	0.5	1	2	mA/V
CCI/CCS/CCV Clamp Voltage		$0.25V < V_{CCV} < 2.0V$, $0.25V < V_{CCI} < 2.0V$, $0.25V < V_{CCS} < 2.0V$	150	300	600	mV
LOGIC LEVELS						
MODE Input Low Voltage					0.8	V
MODE Input Middle Voltage			1.6	1.8	2.0	V
MODE Input High Voltage			2.8			V
MODE Input Bias Current		MODE = 0V or 3.6V	-2		+2	μA
ACOK AND PKPRES						
ACOK Input Voltage Range			0		28	V
ACOK Sink Current		$V_{ACOK} = 0.4V$, ACIN = 1.5V	1			mA
ACOK Leakage Current		$V_{ACOK} = 28V$, ACIN = 2.5V			1	μA
PKPRES Input Voltage Range			0		LDO	V
PKPRES Input Bias Current			-1		+1	μA
PKPRES Battery Removal Detect Threshold		MAX8725, \overline{PKPRES} rising	55			% of LDO
PKPRES Hysteresis		MAX8725		1		%
PDS, PDL SWITCH CONTROL						
PDS Switch Turn-Off Threshold		$V_{DCIN} - V_{BATT}$, V_{DCIN} falling	50	100	150	mV
PDS Switch Threshold Hysteresis		$V_{DCIN} - V_{BATT}$	100	200	300	mV
PDS Output Low Voltage, PDS Below SRC		$I_{PDS} = 0A$	8	10	12	V
PDS Turn-On Current		PDS = SRC	6	12		mA
PDS Turn-Off Current		$V_{PDS} = V_{SRC} - 2V$, $V_{DCIN} = 16V$	10	50		mA
PDL Switch Turn-On Threshold		$V_{DCIN} - V_{BATT}$, V_{DCIN} falling	50	100	150	mV
PDL Switch Threshold Hysteresis		$V_{DCIN} - V_{BATT}$	100	200	300	mV

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ELECTRICAL CHARACTERISTICS (continued)

(Circuit of Figure 1, $V_{DCIN} = V_{CSSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, $T_A = 0^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
PDL Turn-On Resistance		PDL = GND	50	100	150	k Ω
PDL Turn-Off Current		$V_{SRC} - V_{PDL} = 1.5V$	6	12		mA
SRC Input Bias Current		SRC = 19V, DCIN = 0V			1	μA
		SRC = 19, $V_{BATT} = 16V$		450	1000	
Delay Time Between PDL and PDS Transitions			2.5	5	7.5	μs

ELECTRICAL CHARACTERISTICS

(Circuit of Figure 1, $V_{DCIN} = V_{CSSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, $T_A = -40^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
CHARGE VOLTAGE REGULATION						
VCTL Range			0		3.6	V
Battery Regulation Voltage Accuracy		$V_{VCTL} = 3.6V$ (3 or 4 cells); not including VCTL resistor tolerances	-0.8		+0.8	%
		$V_{VCTL} = 3.6V/20$ (3 or 4 cells); not including VCTL resistor tolerances	-0.8		+0.8	
		$V_{VCTL} = 3.6V$ (3 or 4 cells); including VCTL resistor tolerances of 1%	-1.0		+1.0	
		$V_{VCTL} = V_{LDO}$ (3 or 4 cells, default threshold of 4.2V/cell)	-0.8		+0.8	
VVCTL Default Threshold		V_{VCTL} rising	4.1		4.3	V
VCTL Input Bias Current		$V_{VCTL} = 3V$	0		2.5	μA
		$V_{DCIN} = 0V$, $V_{VCTL} = 5V$	0		12	
CHARGE-CURRENT REGULATION						
ICTL Range		MAX1909	0		3.6	V
		MAX8725	0		3.2	
CSIP-to-CSIN Full-Scale Current-Sense Voltage			69.37		80.63	mV
Charge-Current Accuracy		MAX1909: $V_{ICTL} = 3.6V$ (not including ICTL resistor tolerances)	-7.5		+7.5	%
		MAX8725: $V_{ICTL} = 3.2V$ (not including ICTL resistor tolerances)	-5		+5	
		MAX1909: $V_{ICTL} = 3.6V \times 0.5$, MAX8725: $V_{ICTL} = 3.2V \times 0.5$ (not including ICTL resistor tolerances)	-5		+5	
		MAX1909: $V_{ICTL} = 0.9V$ (not including ICTL resistor tolerances)	-7.5		+7.5	
		MAX8725: $V_{ICTL} = 0.18V$ (not including ICTL resistor tolerances)	-30		+30	

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MAX1909/MAX8725

ELECTRICAL CHARACTERISTICS (continued)

(Circuit of Figure 1, $V_{DCIN} = V_{CSSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, $T_A = -40^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Charge-Current Accuracy		MAX1909: $V_{ICTL} = 3.6V \times 0.5$, MAX8725: $V_{ICTL} = 3.2V \times 0.5$ (including ICTL resistor tolerances of 1%)	-7.0		+7.0	%
		$V_{ICTL} = V_{LDO}$ (default threshold of 45mV)	-5		+5	
VICTL Default Threshold		VICTL rising	4.3			V
BATT/CSIP/CSIN Input Voltage Range			0		19	V
CSIP/CSIN Input Current		Charging enabled			650	μA
ICTL Power-Down Mode Threshold Voltage		MAX1909			0.75	V
		MAX8725			0.06	
ICTL Power-Up Mode Threshold Voltage		MAX1909	0.85			V
		MAX8725	0.11			
INPUT CURRENT REGULATION						
CSSP-to-CSSN Full-Scale Curren:-Sense Voltage			72.75		77.25	mV
Input Current-Limit Accuracy		$V_{CLS} = REF$	-3		+3	%
		$V_{CLS} = REF \times 0.75$	-3		+3	
		$V_{CLS} = REF \times 0.5$	-4		+4	
CSSP/CSSN Input Voltage Range			8.0		28	V
CSSP/CSSN Input Current		$V_{CSSP} = V_{CSSN} = V_{DCIN} > 8.0V$			730	μA
CLS Input Range			1.6		REF	V
IINP Transconductance		$V_{CSSP} - V_{CSSN} = 56mV$	2.7		3.3	mA/V
IINP Accuracy		$V_{CSSP} - V_{CSSN} = 75mV$, terminated with $10k\Omega$	-7.5		+7.5	%
		$V_{CSSP} - V_{CSSN} = 56mV$, terminated with $10k\Omega$	-5		+5	
		$V_{CSSP} - V_{CSSN} = 20mV$, terminated with $10k\Omega$	-10		+10	
IINP Output Current		$V_{CSSP} - V_{CSSN} = 150mV$, $V_{IINP} = 0V$	350			μA
IINP Output Voltage		$V_{CSSP} - V_{CSSN} = 150mV$, $V_{IINP} = float$	3.5			V
SUPPLY AND LINEAR REGULATOR						
DCIN Input Voltage Range	V_{DCIN}		8.0		28	V
DCIN Undervoltage-Lockout Trip Point		DCIN falling	7			V
		DCIN rising			7.85	
DCIN Quiescent Current	I_{DCIN}	$8.0V < V_{DCIN} < 28V$			6	mA
BATT Input Current	I_{BATT}	$V_{BATT} = 2V$ to $19V$, $V_{DCIN} > V_{BATT} + 0.3V$			500	μA
LDO Output Voltage		$8.0V < V_{DCIN} < 28V$, no load	5.25		5.55	V
LDO Load Regulation		$0 < I_{LDO} < 10mA$			115	mV

Multichemistry Battery Chargers with Automatic System Power Selector

ELECTRICAL CHARACTERISTICS (continued)

(Circuit of Figure 1, $V_{DCIN} = V_{CSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, $T_A = -40^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
LDO Undervoltage-Lockout Trip Point		$V_{DCIN} = 8.0V$	3.20		5.15	V
REFERENCE						
REF Output Voltage	Ref	$0 < I_{REF} < 500\mu A$	4.1960		4.2520	V
REF Undervoltage-Lockout Trip Point		REF falling			3.9	V
TRIP POINTS						
BATT POWER_FAIL Threshold		$V_{DCIN} - V_{BATT}$, V_{DCIN} falling	50		150	mV
BATT POWER_FAIL Threshold Hysteresis			100		300	mV
ACIN Threshold		ACIN rising	2.007		2.089	V
ACIN Threshold Hysteresis			10		30	mV
SWITCHING REGULATOR						
DHI Off-Time		$V_{BATT} = 16.0V$, $V_{DCIN} = 19V$, $V_{MODE} = 3.6V$	360		440	ns
DHI Minimum Off-Time		$V_{BATT} = 16.0V$, $V_{DCIN} = 17V$, $V_{MODE} = 3.6V$	260		350	ns
DLOV Supply Current	I_{DLOV}	DLO low			10	μA
Sense Voltage for Battery Undervoltage Charge Current		MAX1909 only, BATT = 3.0V per cell	3		6	mV
Battery Undervoltage Threshold		MAX1909 only, MODE = float (3 cell), V_{BATT} rising	9.18		9.42	V
		MAX1909 only, MODE = LDO (4 cell), V_{BATT} rising	12.235		12.565	
DHIV Output Voltage		With respect to SRC	-4.5		-5.5	V
DHIV Sink Current			10			mA
DHI On-Resistance Low		$DHI = V_{DHIV}$, $I_{DHI} = -10mA$			5	Ω
DHI On-Resistance High		$DHI = V_{CSSN}$, $I_{DHI} = 10mA$			4	Ω
DLO On-Resistance High		$V_{DLOV} = 4.5V$, $I_{DLO} = +100mA$			7	Ω
DLO On-Resistance Low		$V_{DLOV} = 4.5V$, $I_{DLO} = -100mA$			3	Ω
ERROR AMPLIFIERS						
GMV Loop Transconductance		$V_{CTL} = 3.6$, $V_{BATT} = 16.8V$, MODE = LDO	0.0625		0.2500	mA/V
		$V_{CTL} = 3.6$, $V_{BATT} = 12.6V$, MODE = FLOAT	0.0833		0.3330	
GMI Loop Transconductance		MAX1909: $I_{CTL} = 3.6V$, MAX8725: $V_{ICTL} = 3.2V$, $V_{CSP} - V_{CSIN} = 75mV$	0.5		2.0	mA/V
GMS Loop Transconductance		$V_{CLS} = 2.048V$, $V_{CSP} - V_{CSSN} = 75mV$	0.5		2.0	mA/V
CCI/CCS/CCV Clamp Voltage		$0.25V < V_{CCV} < 2.0V$, $0.25V < V_{CCI} < 2.0V$, $0.25V < V_{CCS} < 2.0V$	150		600	mV
LOGIC LEVELS						
MODE Input Low Voltage					0.8	V
MODE Input Middle Voltage			1.6		2.0	V

Multichemistry Battery Chargers with Automatic System Power Selector

ELECTRICAL CHARACTERISTICS (continued)

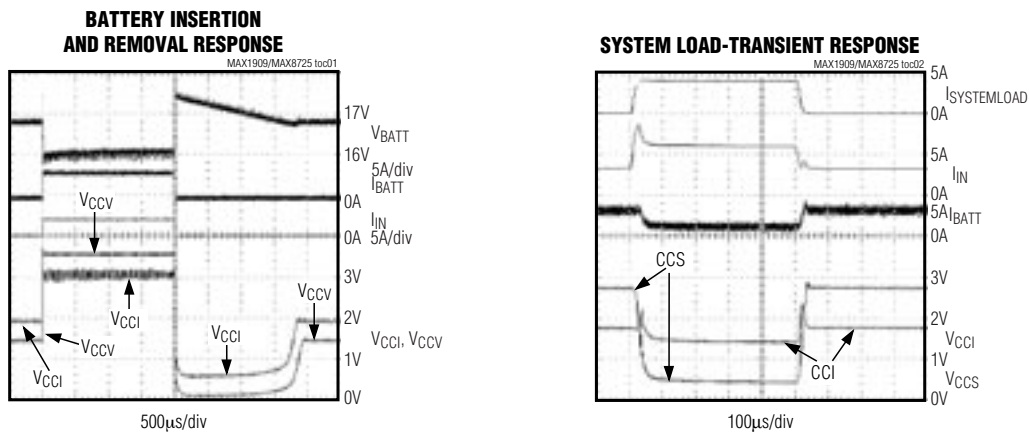
(Circuit of Figure 1, $V_{DCIN} = V_{CSP} = V_{CSSN} = 18V$, $V_{BATT} = V_{CSIP} = V_{CSIN} = 12V$, $V_{VCTL} = V_{ICTL} = 1.8V$, MODE = float, ACIN = 0, CLS = REF, GND = PGND = 0, PKPRES = GND, LDO = DLOV, $T_A = -40^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
MODE Input High Voltage			2.8			V
ACOK AND PKPRES						
ACOK Input Voltage Range			0		28	V
ACOK Sink Current		$V_{ACOK} = 0.4V$, ACIN = 1.5V	1			mA
PKPRES Input Voltage Range			0		LDO	V
PKPRES Battery Removal Detect Threshold		MAX8725, PKPRES rising	55			% of LDO
PDS, PDL SWITCH CONTROL						
PDS Switch Turn-Off Threshold		$V_{DCIN} - V_{BATT}$, V_{DCIN} falling	50		150	mV
PDS Switch Threshold Hysteresis		$V_{DCIN} - V_{BATT}$	100		300	mV
PDS Output Low Voltage, PDS Below SRC		$I_{PDS} = 0A$	8		12	V
PDS Turn-On Current		PDS = SRC	6			mA
PDS Turn-Off Current		$V_{PDS} = V_{SRC} - 2V$, $V_{DCIN} = 16V$	10			mA
PDL Switch Turn-On Threshold		$V_{DCIN} - V_{BATT}$, V_{DCIN} falling	50		150	mV
PDL Switch Threshold Hysteresis		$V_{DCIN} - V_{BATT}$	100		300	mV
PDL Turn-On Resistance		PDL = GND	50		150	k Ω
PDL Turn-Off Current		$V_{SRC} - V_{PDL} = 1.5V$	6			mA
SRC Input Bias Current		SRC = 19, $V_{BATT} = 16V$			1000	μA

Note 1: Guaranteed by design. Not production tested.

Typical Operating Characteristics

(Circuit of Figure 2, $V_{DCIN} = 20V$, charge current = 3A, 4 Li+ series cells, $T_A = +25^{\circ}C$, unless otherwise noted.)

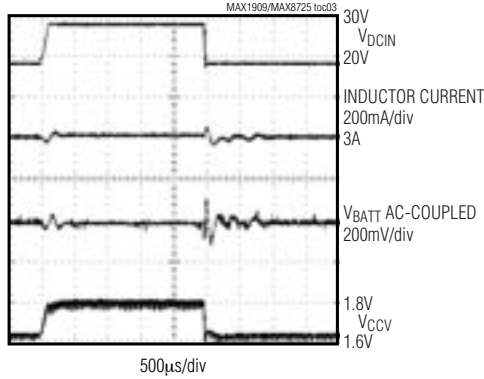


Multichemistry Battery Chargers with Automatic System Power Selector

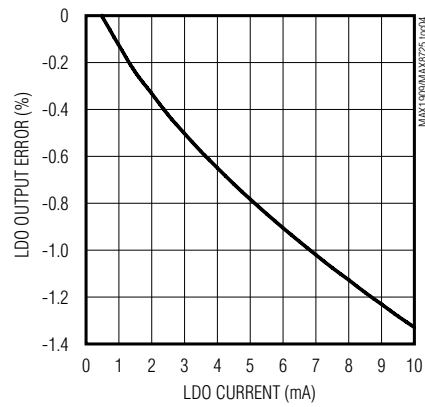
Typical Operating Characteristics (continued)

(Circuit of Figure 2, $V_{DCIN} = 20V$, charge current = 3A, 4 Li+ series cells, $T_A = +25^\circ C$, unless otherwise noted.)

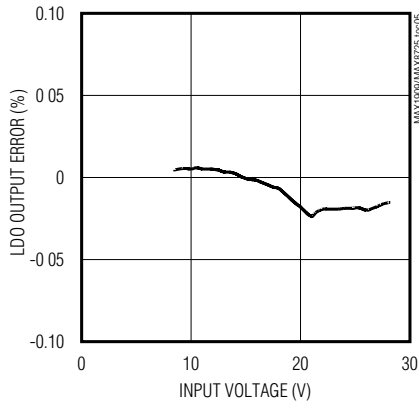
LHE-TRANSIENT RESPONSE



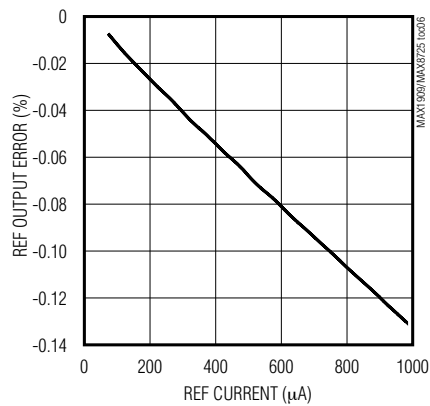
LDO LOAD REGULATION



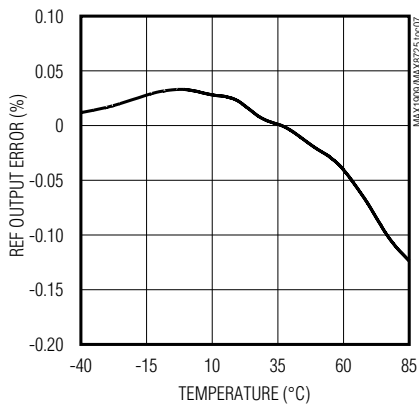
LDO LINE REGULATION



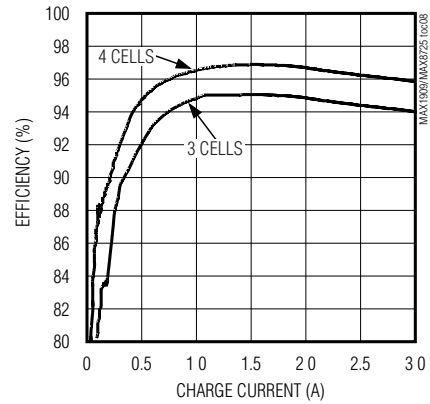
REF LOAD REGULATION



REF vs. TEMPERATURE



EFFICIENCY vs. CHARGE CURRENT



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