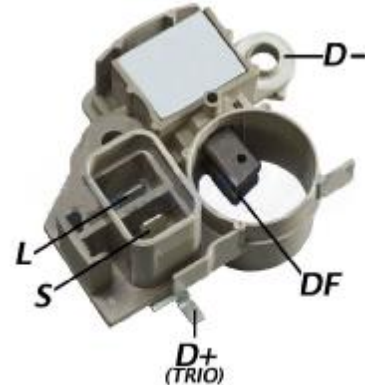


Multifunctional regulator E16H-14V – Replaces Mitsubishi

Feature overview

- FULLY MONOLITHIC DESIGN
- LOW SIDE FIELD DRIVER
- THERMAL PROTECTION
- FIELD SHORT CIRCUIT PROTECTION
- PROTECTED DIAGNOSTIC LAMP DRIVER
- PROTECTED HIGH SIDE RELAY DRIVER
- COMPLEX DIAGNOSTICS
- LOAD RESPONSE CONTROL
- DFM OUTPUT (FIELD MONITOR)



E16H-14V Replaces Mitsubishi

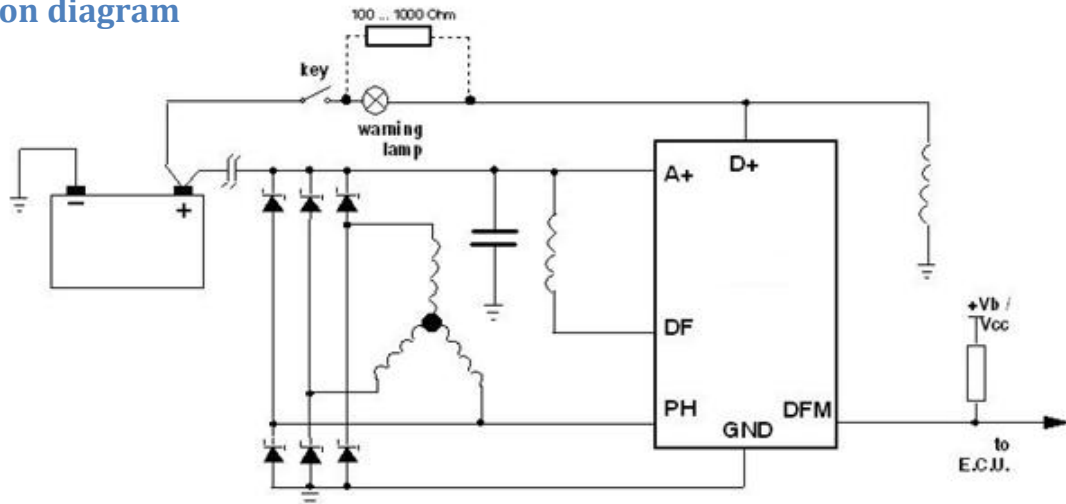
Original code number:	A 866 X 05270, A 866 X 05272, A 866 X 09071, A 866 X 09072, A 866 X 09771, A 866 X 09782, A 866 X 12472, MD611432, MD611565, MD611588, MD611710, MD618483.
Application:	MITSUBISHI: L200 1.8b, 2.0, 2.4, 2.6; Pajero 2.4b, 2.6b; Starion 2.0 EX Turbo; L300 2.0, 2.0 4X4, 2.4, 2.4 4X4; Colt 1.3i, 1.5i; Galant 2.0, 2.4; Lancer 1.2, 1.3, 1.5; Sapporo 2.4i; Space Wagon 1.8; NISSAN, DODGE.
Alternator:	MITSUBISHI: A2T02271/ 471, A2T03/ 477, A2T03972 / 04271 / 06871 / 07292 / 07292A / 09392 / 09493 / 09691 / 09792 / 09792ZC / 14792 / 14972 / 17692 / 48176 / 48176A / 48176B / 48195 / 48195A / 18195B / 48691 / 48791 / 49972 / 49977 / 49992, A3T00692 / 00792 / 02193 / 02198 / 03392 / 03393 / 03471 / 03492 / 03493 / 03493ZC / 04292 / 04493 / 08293 / 41876 / 45693 / 45694, A5T41094B, MD102084/ 85/ 88, MD105339/ 6713/ 8230/ 8509/ 8809, MD110318/ 1148/ 1233/ 2322/ 2323/ 4620/ 6418/ 6427/ 7156, MD125096/ 5569/ 6796, MD133171/ 4315/ 6838/ 6839, MD140247/ 1855/ 9750, MD153843, MD166174/ 9683/ 9683D.

Description

The E16H-14V is a monolithic multifunction alternator voltage regulator intended for use in automotive application. It includes the control section, the field power stage, fault diagnostic circuit which drives a warning lamp.

Multifunctional regulator E16H-14V – Replaces Mitsubishi

Application diagram



Electrical characteristics

Absolute maximum ratings

Symbol	Parameter	Value	Unit
VS	DC Supply Voltage (2 min. @ 25°)	24	V
	Transient Supply Voltage (load dump); $t < 0.5s$ @ 25°C	40	V
	Transient Supply Voltage (low energy spikes pulse ISO7637/1)	60	V
IO	Output Current Capability	internally limited	A
Ptot	Power Dissipation(@ Tcase = 150°C, I _{field} = 5A)	Tbd	
	Reverse Voltage all pins @ 25°C, T = 15s	-2.5	V
	DC Pin Current (bonding limitation) on DF, A+, GND pins	11	A
	EDS Voltage (Human body model)	±4	KV

Thermal data

Symbol	Parameter	Value	Unit
T _{case}	Case temperature	-40 to 160	°C
T _{stg}	Storage temperature	-40 to 170	°C
T _{sh}	Thermal shutdown	185 ±15	°C
R _{th j-case}	Thermal Resistance Junction-case Max.	1.5	°C/W

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Electrical specifications

($-40\text{ °C} \leq T_J \leq 125\text{ °C}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{bat}	Operating Supply Voltage		8.5		18	V
I_{bsink}	Supply Battery Current				50	mA
I_{bstby}	Stand-by Current	$V_{bat} = 12V, T = 25\text{ °C}$			300	μA
		$V_{bat} = 12V, T = 40\text{ °C}$			500	
V_{reg}	Regulated Voltage & Therm. Drift (standard version)	$I_{alt} = 0.5 \cdot I_{nom};$ $rpm = 0.5 \cdot RPM_{MAX}; T = 20\text{ °C}$	14.3 -4	14.45 -3	14.6 -2	V mV/°C
$V_{reg}^{(1)}$	Regulated Voltage & Therm. Drift (optional version)	$I_{alt} = 0.2 \cdot I_{nom};$ $rpm = 0.5 \cdot RPM_{MAX}; T = 20\text{ °C}$	14.1 -11.5	14.5 -10	14.9 -8.5	V mV/°C
f_{sw}	Switching Frequency	in FSDF	30		400	Hz
V_{rpm}	Delta V_{rpm}	$1800 < rpm < 12000;$ $I_{alt} = 0.3 \cdot I_{nom}$			200	mV
V_{load}	Delta V_{load}	$0.1 \cdot I_{nom} < I_{alt} < 0.9 \cdot I_{nom};$ $rpm = 0.5 \cdot rpm_{max}$			200	mV
V_{reg}	Reg. Voltage without Battery	$I_{alt} = 3A$ resistive			16	V
V_{OV}	D+ Drivers Disable Thershold	Voltage on pin A+ to have D+ = OFF	18		22	V
T_{j-sd}	Thermal Shut-down	DF = OFF STATE D+ = OFF STATE	170		200	°C
$T_{j-sd-hys}$	Thermal Shut-down Hysteresis	DF, D+ = from off state (due to thermal shutdown) to on	2		10	°C
R_{on}	Low Side Driver R_{dson}	$T = 150\text{ °C}; I = 5A$			230	$m\Omega$
R_{on}	Low Side Driver R_{dson}	$T = 25\text{ °C}; I = 5A$			130	$m\Omega$
V_F	Freewheeling Diode DF	$I_F = 5A$			2	V
I_{fSC}	Short Circuit Threshold DF	DF = 12V; $T = -40$ to 25 °C	8.5		18	A
I_{fSC}	Short Circuit Threshold DF	DF = 12V; $T = 25$ to 125 °C	7		18	A
V_{s1}	Output Short to GROUND Threshold DF		2.1		3.9	V
$FSDF$	Pre-excitation F.S.D.F	$f = 348Hz \pm 15\%$	10.62	12.5	14.38	%

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Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
t_{ST}	Soft Start Delay Time	activated at first running-on only		0		s
t_{SL}	Soft Attack Time	from 0 to 100% field duty cycle	2.5	2.88	3.39	s
BI	Soft Attack Blind Zone	% of maximum D.C. immediate variation of soft attack	0		10	%
t_{rise}	Output Voltage Rise Time	$I_{field} = 3A$ resistive	5		50	μs
t_{fall}	Output Voltage Fall Time		5		50	μs
I_{fk}	Output Field Driver Leakage Current	DF = 24V			1	mA
V_{HS}	High Side Driver Saturation Voltage	$I_{source} = 1A$			1.2	V
V_{LS}	Low Side Driver Saturation Voltage	$I_{sink} = 0.25A$			1.5	V
VLSB	Selfbias without supply lamp driver voltage				4	V
IHSC	High Side Current Limitation	A+ = 17.5V; D+ = GND	1.2		3	A
ILSC	Low Side Current Limitation	A+ = D+ = 17.5V	0.45		1.5	A
V_{thD+}	Enable Regulator Voltage D+		0.8	1	1.15	V
I_{thD+}	Enable Regulator Pull-down Current		0.4		3.5	mA
DISAB	Soft Attack Inhibition Frequency		265	313	360	Hz
EN ₁	Soft start delay time enable frequency		88	104	120	Hz
EN _{1_hy}	Soft start delay time enable frequency hysteresis		EN ₁ -8	EN ₁ -10	EN ₁ -12	Hz
VPHL1	Enable Control Voltage PH high threshold	Square wave 1KHz	0.67	0.795	0.92	V
VPHL2	Enable Control Voltage PH low threshold		VPHL1 -0.48	VPHL1 -0.57	VPHL1 -0.66	V
t_{PH}	PH Filtering Time		15		120	μs
VPHH1	Diag. Phase Loss High Voltage		9	10.25	11.5	V
VPHH2	Diag. Phase Loss Low Voltage		4	5	6	V
t_{PHD}	Diagnostic PH Filtering Time		50		200	μs
I_{PH}	Phase Pull-down Current		1		8	mA
t_D	Diagnostic Alarm Delay		0.48	0.575	0.65	s
f_{DFM}	DFM Open Drain Switching Frequency	in FSDF	30		400	Hz
V_{ol}	Output Low Voltage DFM	$I_{sink} = 25mA$			1.5	V

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Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_{dfmt}	Short Circuit Protection DFM	VDF_MON = 12V	25		200	mA
I_{lk}	Output Leakage Current DFM	VDF_MON = 24V			0.1	mA
t_{TM}	DFM Output Voltage rise time	R = 2.7k Ω ; C = 1nF; V _{alim} = 13.5V	0.05		50	μ s
T_TD	DFM Output Voltage fall time	R = 2.7k Ω ; C = 1nF; V _{alim} = 13.5V	0.05		50	μ s

(1) Available through a metal option of the actual device.

Thermal compensation

Temperature (°C)	Vreg (V)		
	Min.	Typ.	Max.
-40	14.43	14.645	14.86
25	14.30	14.45	14.60
125	13.90	14.15	14.40

