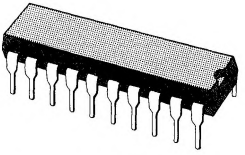
SGS-THOMSON MICROELECTRONICS

L6114
L6115

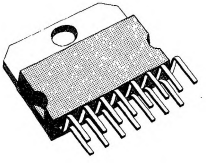
QUAD 100 V, DMOS SWITCH

- OUTPUT VOLTAGE TO 100 V
- 0.7 Ω $R_{DS(ON)}$
- SUPPLY VOLTAGE UP TO 60 V
- LOW INPUT CURRENT
- TTL/CMOS COMPATIBLE INPUTS
- HIGH SWITCHING FREQUENCY (200 KHz)

MultiPower BCD Technology



Powerdip 14 + 3 + 3



Multiwatt-15

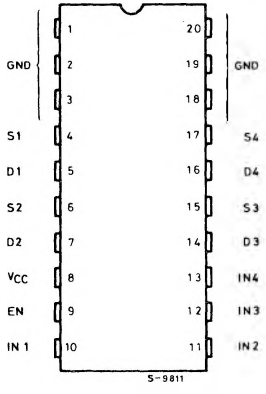
ORDER CODES : L6114 (Powerdip)
L6115 (Multiwatt-15)

DESCRIPTION

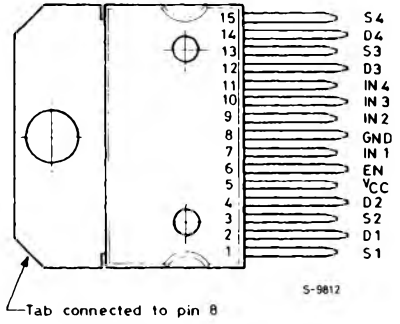
Realized with the Multipower-BCD mixed bipolar/CMOS/DMOS process, the L6114/15 monolithic quad DMOS switch is designed for high current, high voltage switching applications. Each of the four switches is controlled by a logic input and all four are controlled by a common enable input. All inputs are TTL/CMOS compatible for direct connection to logic circuits. Each source is available for the insertion of the sense resistors in current control applications.

Two versions are available : the L6114 mounted in a Powerdip 14+3+3 package and the L6115 in a 15-lead Multiwatt package.

CONNECTION DIAGRAMS (top view)



L6114 (Powerdip)



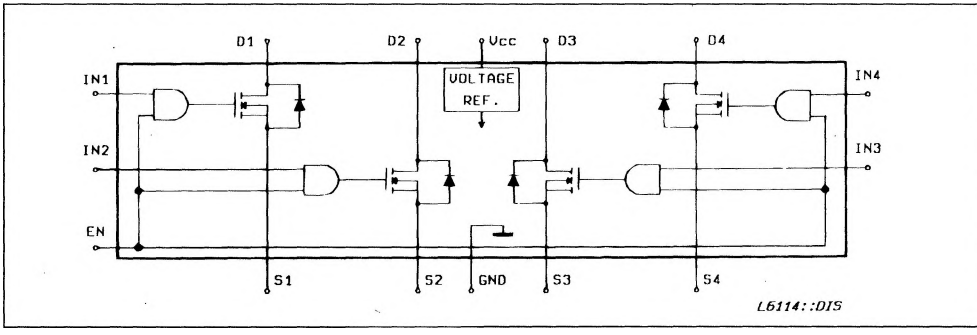
L6115 (Multiwatt-15)

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter			Value	Unit
V_{DS}	Drain-source Voltage			100	V
V_{CC}	Supply Voltage			60	V
I_D	Continuous Drain Current	@ T_{pins} = 90 °C	Powerdip	1.5	A
		@ T_{case} = 90 °C	Multiwatt –15	3	A
I_{DM} (*)	Pulsed Drain Current		Powerdip	5	A
			Multiwatt –15	8	A
I_{SD}	Continuous Source-drain Diode Current	@ T_{pins} = 90 °C	Powerdip	1.5	A
		@ T_{case} = 90 °C	Multiwatt –15	3	A
I_{SDM}	Pulsed Source Drain Diode Current		Powerdip	5	A
			Multiwatt –15	8	A
V_{IN}	Input Voltage			7	V
V_{EN}	Enable Voltage			7	V
V_S	Source Voltage			– 1 to + 4	V
P_{tot}	Total Power Dissipation	@ T_{pins} = 90 °C	Powerdip	4.3	W
		@ T_{case} = 90 °C	Multiwatt –15	20	W
		@ T_{amb} = 70 °C	Powerdip	1.3	W
		@ T_{amb} = 70 °C	Multiwatt –15	2.3	W
T_{stg}, T_j	Storage and Junction Temperature Range			– 40 to + 150	°C

(*) Pulse width ≤ 300 µs, duty cycle ≤ 10 %.
Note : I_D, I_{DM}, I_{SD}, I_{SDM} are given per channel.

BLOCK DIAGRAM



THERMAL DATA

			Powerdip	Multiwatt–15
$R_{th\ j\text{-}pins}$	Thermal Resistance Junction-pins	Max	14 °C/W	–
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	–	3 °C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	65 °C/W	35 °C/W

ELECTRICAL CHARACTERISTICS (T_j = 25 °C, V_{CC} = 40 V, unless otherwise specified)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage			14		48	V
I_{CC}	Supply Current	All V_{IN} = H V_{EN} = Square Wave (200 KHz, 50 % DC)			9		mA
I_Q	Quiescent Current	V_{EN} = L			2	3	mA
BV_{DSS}	Drain Source Breakdown Voltage	I_D = 1 mA V_{EN} = L		100			V
I_{DSS}	Output Leakage Current	V_{EN} = L	V_{DS} = 100 V			1	mA
			V_{DS} = 80 V T_j = 125 °C		1		mA
$R_{DS\ (on)}$ (*)	Static Drain-source on Resistance	$V_{CC} \geq$ 14 V I_D = 1.5 A V_{EN}, V_{IN} = H			0.7		Ω
$V_{IN\,L}$, $V_{EN\,L}$	Input Low Voltage			– 0.3		0.8	V
$V_{IN\,H}$, $V_{EN\,H}$	Input High Voltage			2		7	V
$I_{IN\,L}$, $I_{EN\,L}$	Input Low Current	V_{IN}, V_{EN} = L				– 100	µA
$I_{IN\,H}$, $I_{EN\,H}$	Input High Current	V_{IN}, V_{EN} = H				10	µA
$t_{d\ (on)}$	Turn on Delay Time	I_D = 1.5 A See Test Circuit and Waveforms			300		ns
t_r	Rise Time				100		ns
$t_{d\ (off)}$	Turn off Delay Time				400		ns
t_f	Fall Time				100		ns
V_{SD} (*)	Source Drain Diode Forward Voltage	I_{SD} = 1.5 A V_{EN} = L				1.5	V
$V_{SD\ (on)}$ (*)	Source Drain Forward Voltage	I_{SD} = 1.5 A V_{IN}, V_{EN} = H				1.2	V

(*) Pulse test : pulse width = 300 µs, duty cycle = 2 %.

SWITCHING TIMES RESISTIVE LOAD

Figure 1 : Test Circuit
(Pins x = Powerdip ; Pins (x) = Multiwatt).

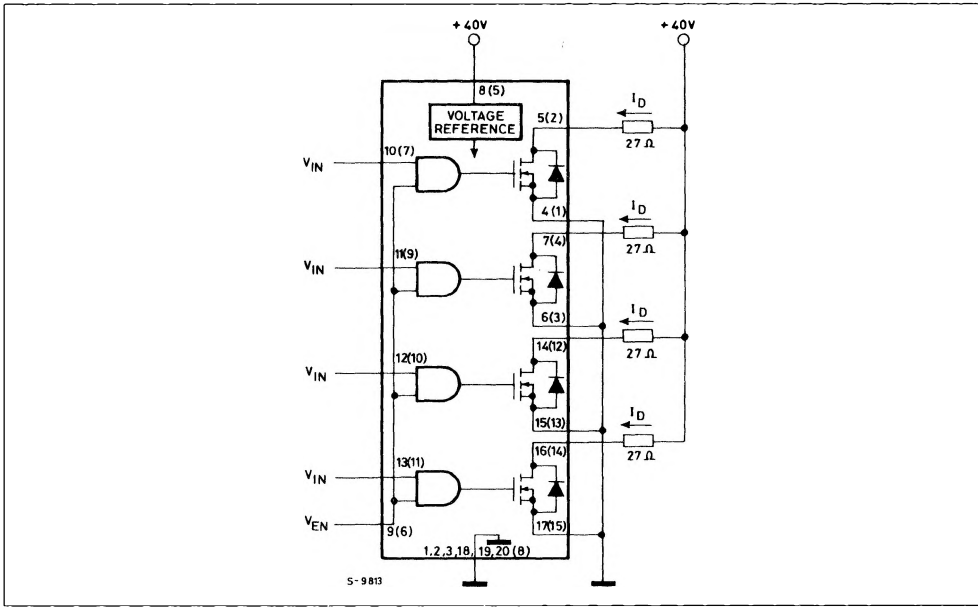
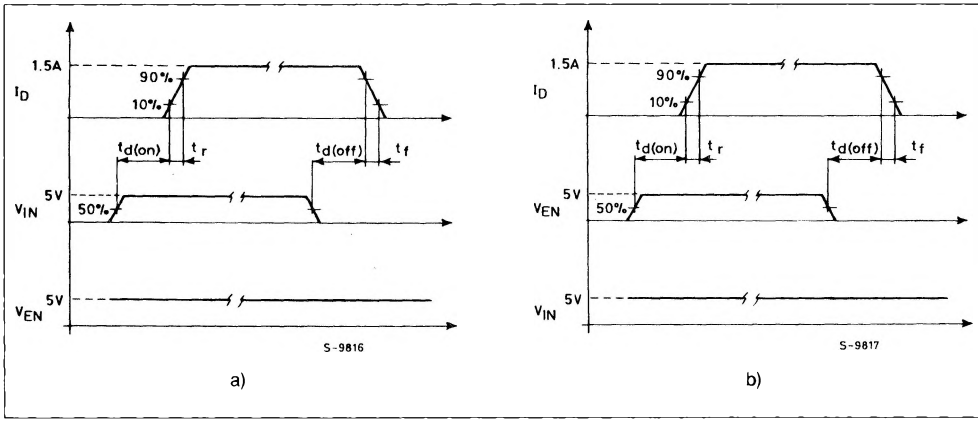
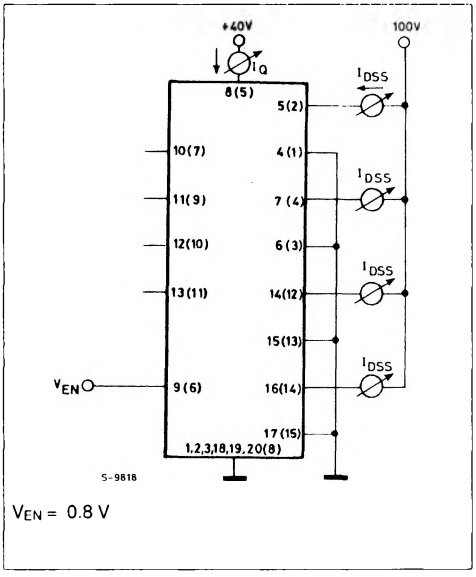


Figure 2 : Waveforms.



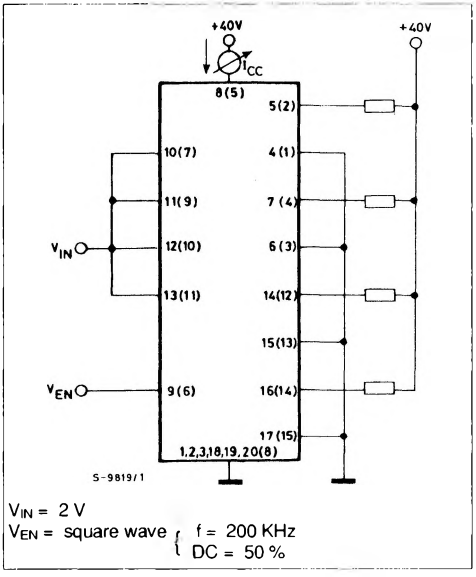
TEST CIRCUIT (Pins x = Powerdip ; Pins (x) = Multiwatt)

Figure 3 : Quiescent Current and Output Leakage Current..



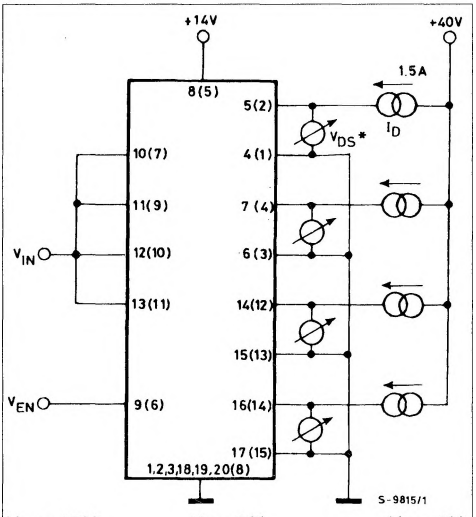
V_{EN} = 0.8 V

Figure 4 : Supply Current.



V_{IN} = 2 V
V_{EN} = square wave { f = 200 KHz, DC = 50 %

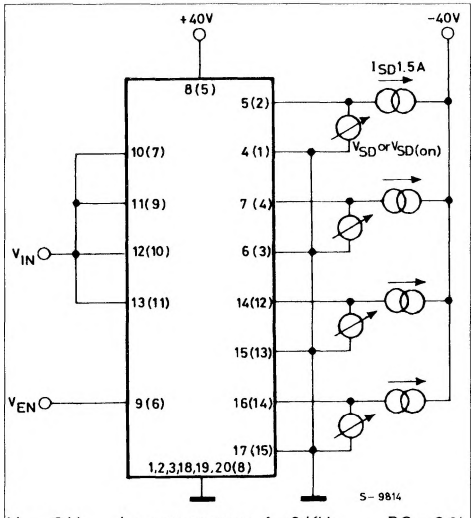
Figure 5 : $R_{DS\,(on)}$.



V_{CC} = 14 V, V_{IN} = 2 V, V_{EN} = 2V
I_D = square wave, f = 3 KHz DC = 2 %
(*) V_{DS} is taken during the time in which the I_D = 1.5 A

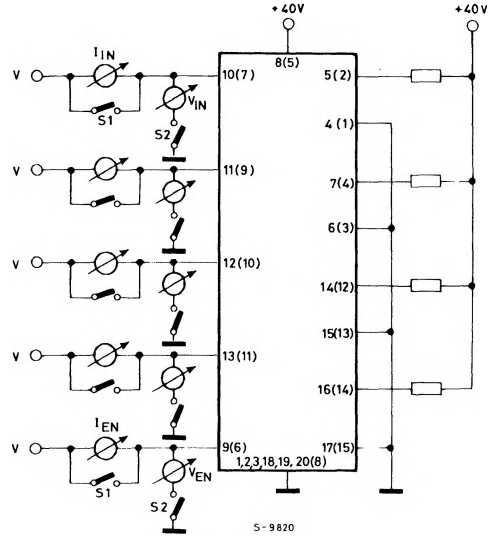
$$R_{DS} = \frac{V_{DS}}{1.5}$$

Figure 6 : Source-drain Diode Forward Voltage.



V_{IN} = 2 V, I_{SD} square wave, f = 3 KHz DC = 2 %
- Set V_{EN} = 0.8 V for V_{SD} (taken during the time in which I_{SD} = 1.5 A)
- Set V_{EN} = 2 V for $V_{SD\,(on)}$ (taken during the time in which I_{SD} = 1.5 A)

Figure 7 : Input Logic Levels



Set	V = 0.8 V	S1,S2 open	for	$I_{IN\,L}$ and $I_{EN\,L}$
Set	V = 0.8 V	S1,S2 close	for	$V_{IN\,L}$ and $V_{EN\,H}$
Set	V = 2 V	S1,S2 open	for	$I_{IN\,H}$ and $I_{EN\,H}$
Set	V = 2 V	S1,S2 close	for	$V_{IN\,H}$ and $V_{EN\,H}$

Figure 8 : Static Drain-source on Resistance.

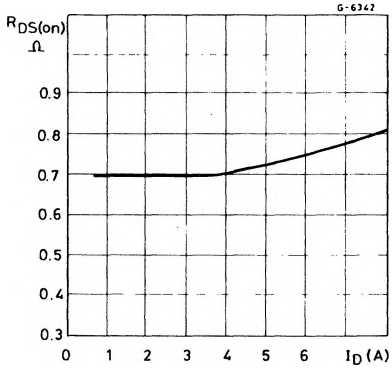


Figure 9 : Normalized Break-down Voltage vs. Temperature.

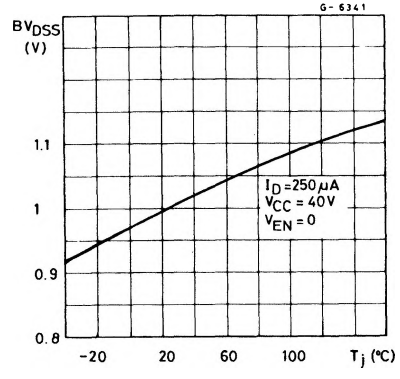


Figure 10 : Normalized on Resistance vs. Temperature.

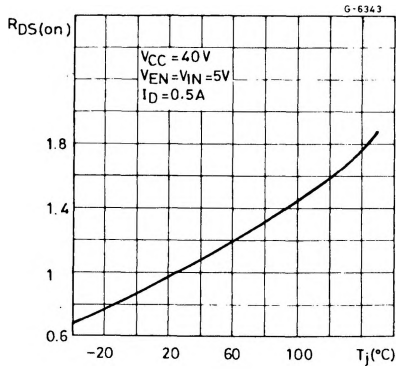


Figure 11 : Typical Source-drain Diode Forward Voltage.

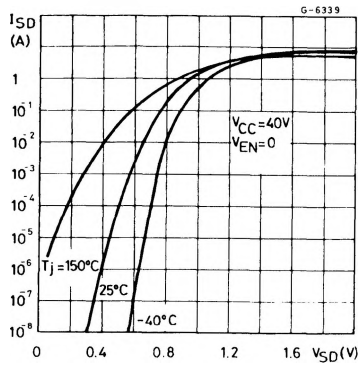
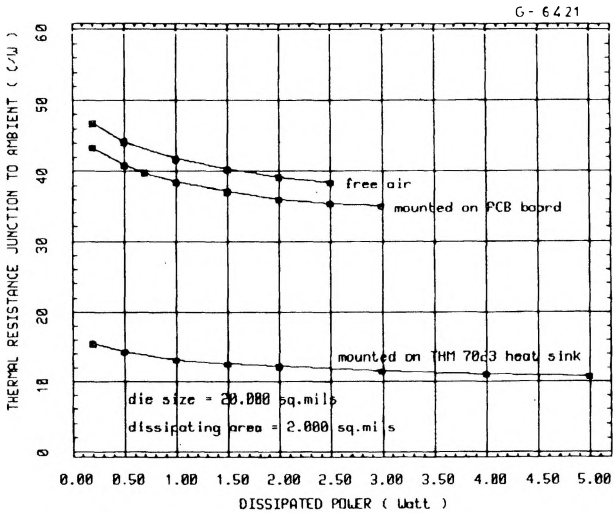


Figure 12 : $R_{th\ j\text{-}amb}$ vs. Dissipated Power(Multiwatt).



(*) $R_{th} \approx 9$ °C/W.

Figure 13 : Transient Thermal Resistance for Single Pulses (Multiwatt).

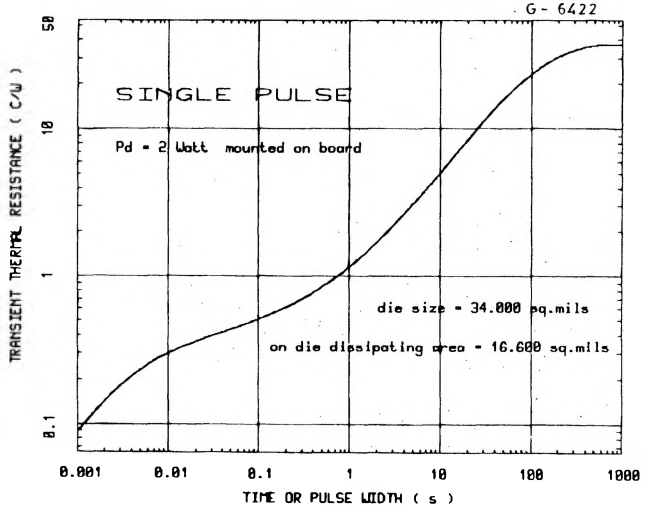


Figure 14 : Peak Transient Thermal Resistance vs.Pulse width and duty cycle (Multiwatt).