STS4DPFS30L

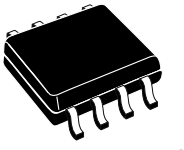
P-CHANNEL 30V - 0.045Ω - 5A SO-8
STripFET™ MOSFET PLUS SCHOTTKY RECTIFIER

Table 1: General Features

MOSFET TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STS4DPFS30L	30 V	< 0.055 Ω	5 A
SCHOTTKY	$I_{F(AV)}$	V_{RRM}	$V_{F(MAX)}$
	3 A	30 V	0.51 V

- TYPICAL $R_{DS(on)}$ = 0.045 Ω
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED
- LOW THRESHOLD DRIVE
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

Figure 1: Package

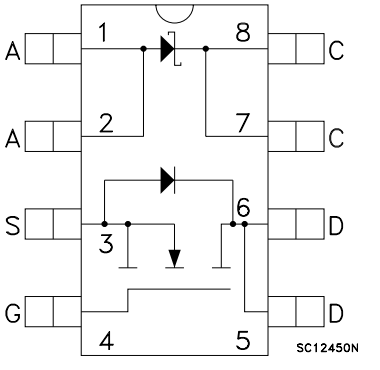


SO-8

DESCRIPTION

This MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

Figure 2: Internal Schematic Diagram



APPLICATIONS

- DC/DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- POWER MANAGEMENT IN CELLULAR PHONES
- DC MOTOR DRIVE

Table 2: Order Codes

PART NUMBER	MARKING	PACKAGE	PACKAGING
STS4DPF30L	4DFS30L	SO-8	TAPE & REEL

Table 3: MOSFET Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	30	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	30	V
V_{GS}	Gate- source Voltage	± 16	V
I_D	Drain Current (continuous) at T_C = 25°C Single Operating	5	A
I_D	Drain Current (continuous) at T_C = 100°C Single Operating	4	A
I_{DM} (•)	Drain Current (pulsed)	20	A
P_{TOT}	Total Dissipation at T_C = 25°C Single Operating	2.5	W
T_j T_{stg}	Operating Junction Temperature Storage Temperature	150 -55 to 150	°C °C

(•) Pulse width limited by safe operating area
Note: For the P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

Table 4: Schottky Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		30	V
$I_{F(RMS)}$	RMS Forward Current		20	A
$I_{F(AV)}$	Average Forward Current	TL = 125°C δ = 0.5	3	A
I_{FSM}	Surge Non Repetitive Forward Current	tp = 10 ms Sinusoidal	75	A
I_{RRM}	Repetitive Peak Reverse Current	tp = 2 µs F = 1 kHz	1	A
I_{RSM}	Non Repetitive Peak Reverse Current	tp = 100 µs	1	A
dv/dt	Critical Rate Of Rise Of Reverse Voltage		10000	V/µs

Table 5: Thermal Data

Rthj-case	Thermal Resistance Junction-case Single Operating	50	°C/W
Rthj-amb	(*)Thermal Resistance Junction-ambient SCHOTTKY	100	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose	300	°C

(*) Mounted on FR-4 board (Steady State)

ELECTRICAL CHARACTERISTICS (T_{CASE} =25°C UNLESS OTHERWISE SPECIFIED)

Table 6: On/Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 µA, V_{GS} = 0	30			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS}= Max Rating V_{DS}= Max Rating, T_C= 125°C			1 10	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS}= ± 16V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D= 250 µA	1	1.6	2.5	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS}= 10 V, I_D= 2.5 A V_{GS}= 4.5 V, I_D= 2.5 A		0.045 0.065	0.055 0.075	Ω Ω

ELECTRICAL CHARACTERISTICS(CONTINUED)

Table 7: Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	V_{DS} = 15 V, I_D= 2.5 A		10		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		1350 490 130		pF pF pF

(1) Pulsed: Pulse duration = 300 µs, duty cycle 1.5%

Table 8: Switching On

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	V_{DD} = 15 V, I_D = 2.5 A, R_G= 4.7 Ω, V_{GS} = 4.5 V (see Figure 16))		25 35		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 24 V, I_D = 5 A, V_{GS} = 5 V (see, Figure 19)		12.5 5 3	16	nC nC nC

Table 9: Switching Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	V_{DD} = 15 V, I_D = 2.5 A, R_G= 4.7 Ω, V_{GS} = 4.5 V (see, Figure 16)		125 35		ns ns

Table 10: Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				5	A
I_{SDM} (2)	Source-drain Current (pulsed)				20	A
V_{SD} (1)	Forward On Voltage	I_{SD} = 5 A, V_{GS} = 0			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 5 A, di/dt = 100 A/µs V_{DD} = 15V, T_j = 150°C (see, Figure 17)		45 36 1.6		ns nC A

Table 11: Schottcky Static Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_R(*)	Reversed Leakage Current	T_J = 25 °C , V_R = 30 V T_J = 125 °C , V_R = 30 V		 0.03	0.2 100	mA mA
V_F(*)	Forward Voltage Drop	T_J = 25 °C , I_F = 3 A T_J = 125 °C , I_F = 3 A		 0.46	0.51 0.46	V V

(1) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(2) Pulse width limited by safe operating area.

Figure 3: Safe Operating

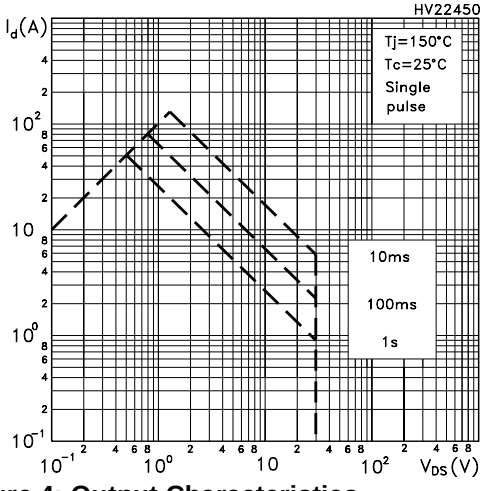


Figure 4: Output Characteristics

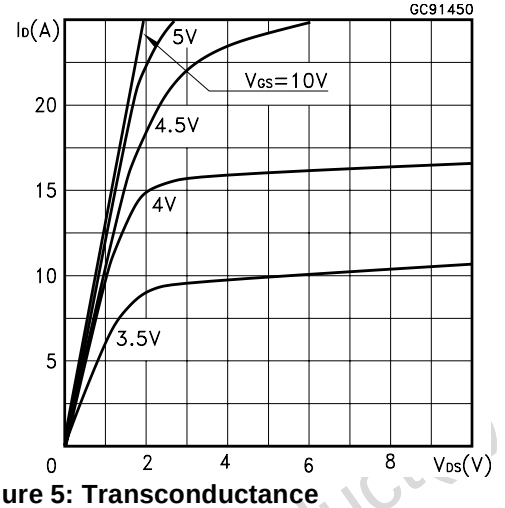


Figure 5: Transconductance

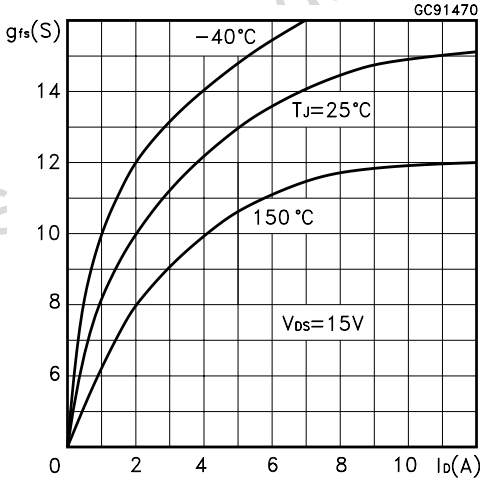


Figure 6: Thermal Impedance

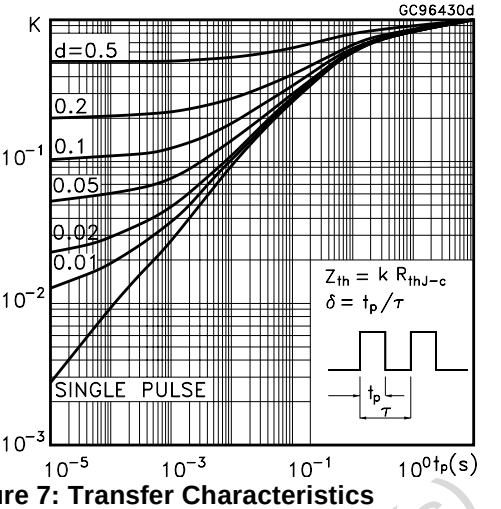


Figure 7: Transfer Characteristics

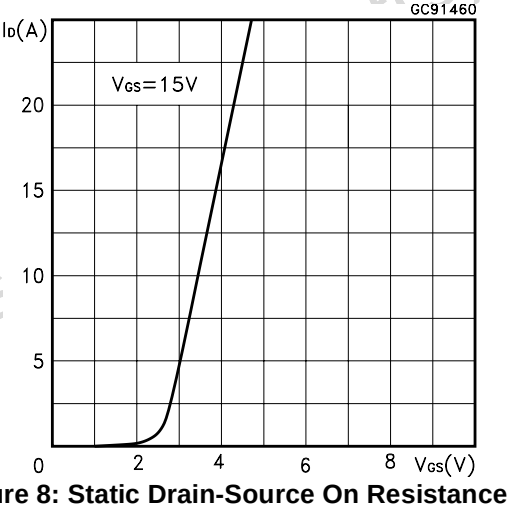


Figure 8: Static Drain-Source On Resistance

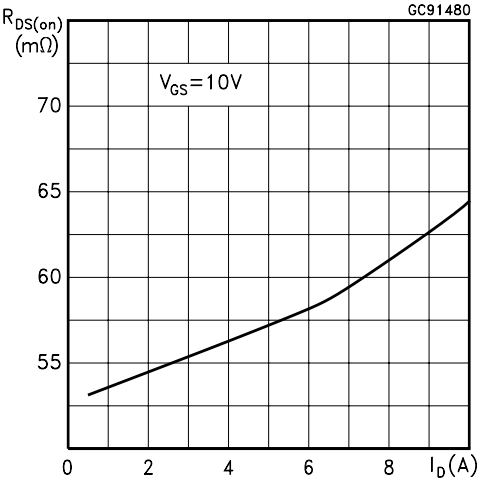


Figure 9: Gate Charge vs Gate-Source Voltage

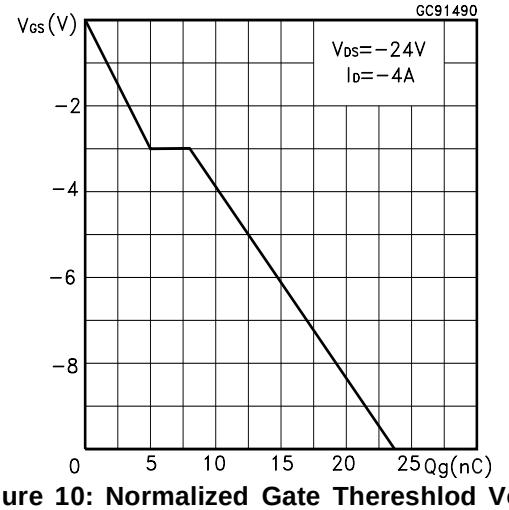


Figure 10: Normalized Gate Thereshlod Voltage vs Temperature

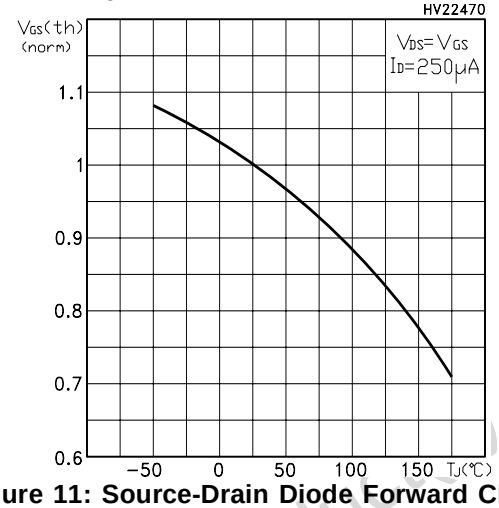


Figure 11: Source-Drain Diode Forward Characteristics

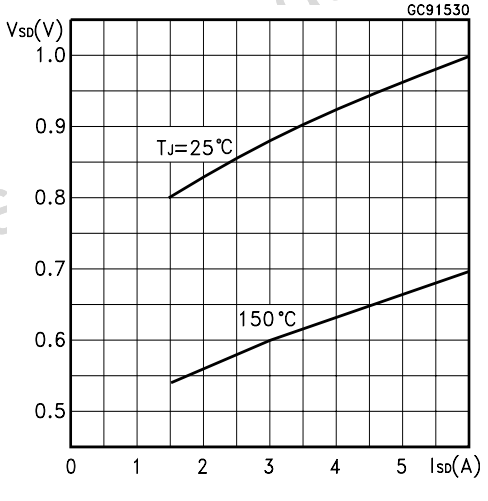


Figure 12: Capacitances Variations

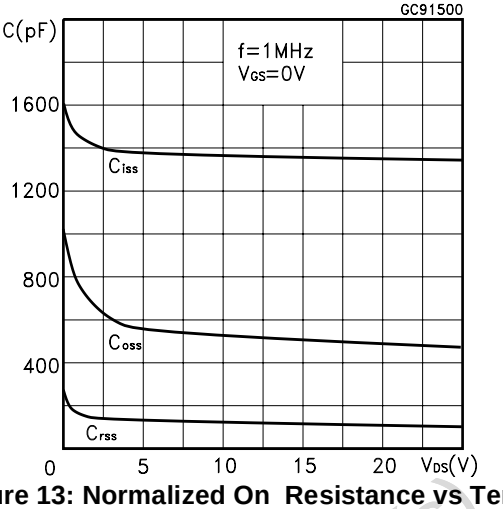


Figure 13: Normalized On Resistance vs Temperature

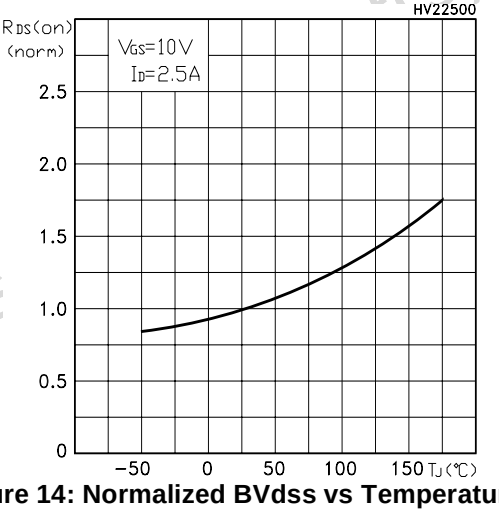


Figure 14: Normalized BVdss vs Temperature

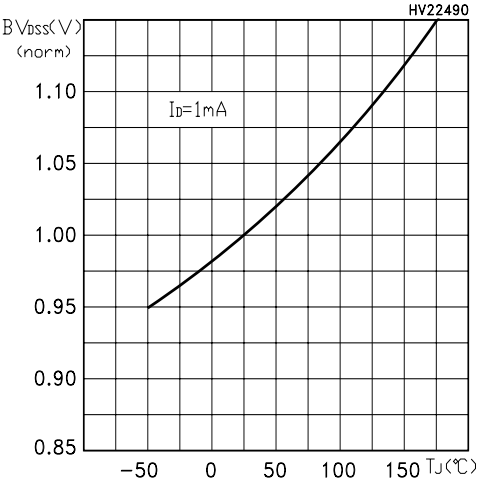


Figure 15: Unclamped Inductive Load Test Circuit

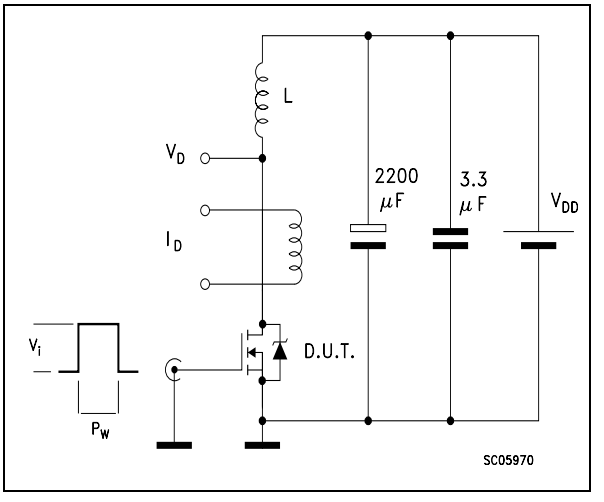


Figure 16: Switching Times Test Circuit For Resistive Load

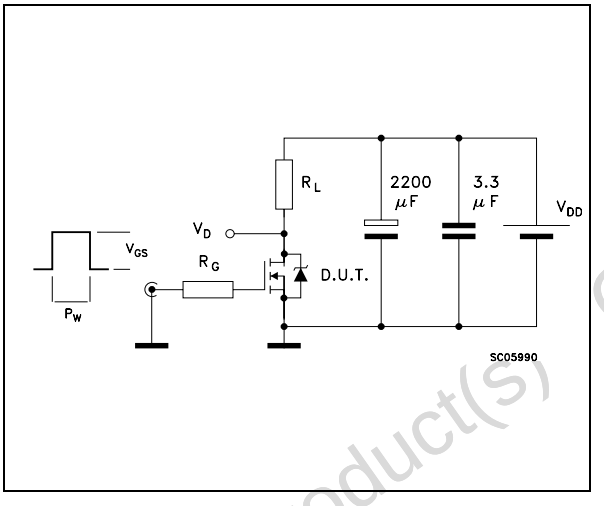


Figure 17: Test Circuit For Inductive Load Switching and Diode Recovery Times

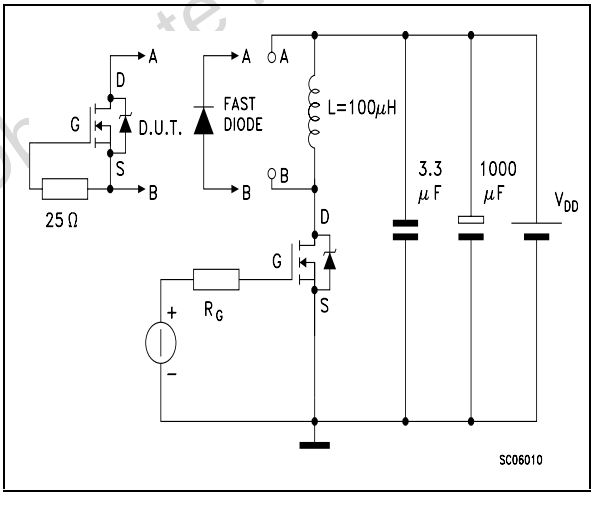


Figure 18: Unclamped Inductive Wafeform

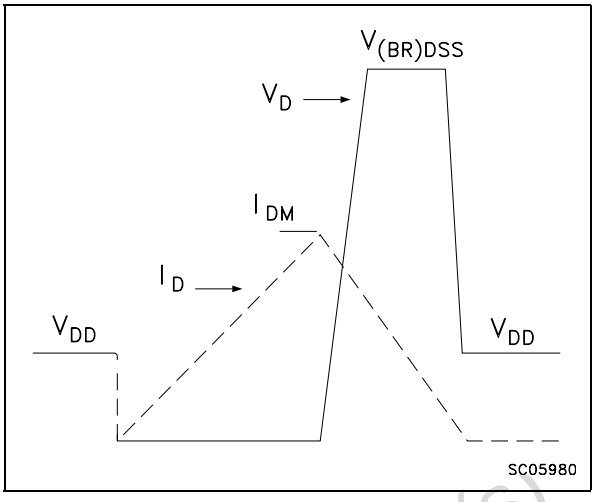
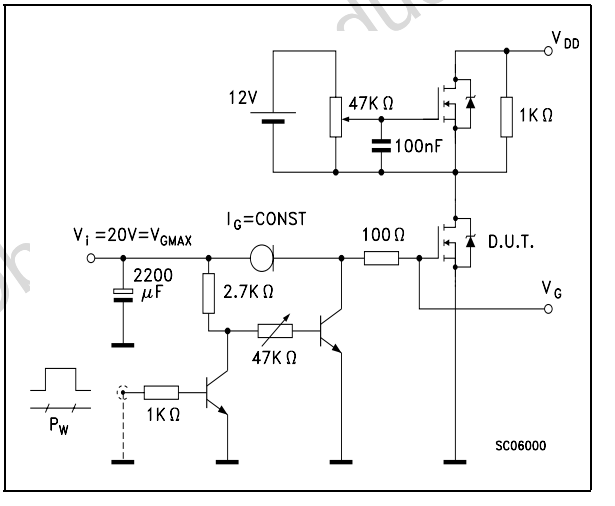


Figure 19: Gate Charge Test Circuit



SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					

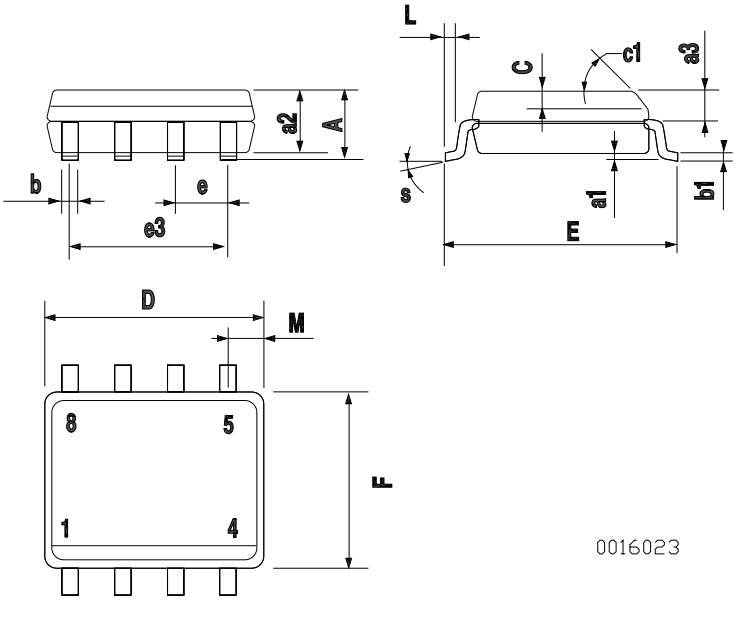


Table 12: Revision History

Date	Revision	Description of Changes
14-Dec-2004	1	First Revision