

4A, 700V N-CHANNEL MOSFET

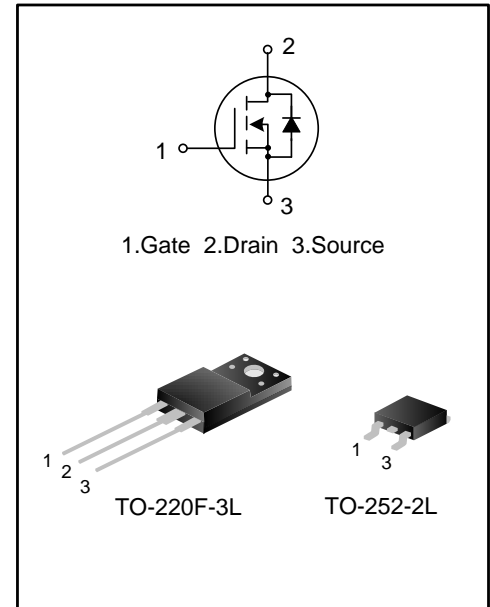
GENERAL DESCRIPTION

SVF4N70F/D is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ structure VDMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are widely used in AC-DC power supplies, DC-DC converters and H-bridge PWM motor drivers.

FEATURES

- ◆ 4A,700V, $R_{DS(on)(typ.)}=2.5\Omega@V_{GS}=10V$
- ◆ Low gate charge
- ◆ Low Crss
- ◆ Fast switching
- ◆ Improved dv/dt capability



ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVF4N70F	TO-220F-3L	SVF4N70F	Pb free	Tube
SVF4N70DTR	TO-252-2L	SVF4N70D	Halogen free	Tape & Reel

ABSOLUTE MAXIMUM RATINGS (T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Ratings		Unit
		SVF4N70F	SVF4N70D	
Drain-Source Voltage	V _{DS}	700		V
Gate-Source Voltage	V _{GS}	±30		V
Drain Current	I _D	T _C =25°C		4.0
		T _C =100°C		2.53
Drain Current Pulsed	I _{DM}	16.0		A
Power Dissipation(T _C =25°C) -Derate above 25°C	P _D	33	77	W
		0.26	0.62	W/°C
Single Pulsed Avalanche Energy(Note 1)	E _{AS}	242		mJ
Operation Junction Temperature Range	T _J	-55~+150		°C
Storage Temperature Range	T _{stg}	-55~+150		°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings		Unit
		SVF4N70F	SVF4N70D	
Thermal Resistance, Junction-to-Case	R _{θJC}	3.79	1.62	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	62.0	°C/W

ELECTRICAL CHARACTERISTICS (T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	700	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =700V, V _{GS} =0V	--	--	1.0	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	--	--	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2.0	--	4.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =2.0A	--	2.5	3.0	Ω
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	--	497.67	--	pF
Output Capacitance	C _{oss}		--	56.43	--	
Reverse Transfer Capacitance	C _{rss}		--	2.36	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =350V, I _D =4.0A, R _G =25Ω, (Note2,3)	--	15.73	--	ns
Turn-on Rise Time	t _r		--	34.40	--	
Turn-off Delay Time	t _{d(off)}		--	24.93	--	
Turn-off Fall Time	t _f		--	23.60	--	
Total Gate Charge	Q _g	V _{DS} =560V, I _D =4.0A, V _{GS} =10V, (Note 2,3)	--	10.34	--	nC
Gate-Source Charge	Q _{gs}		--	3.15	--	
Gate-Drain Charge	Q _{gd}		--	3.90	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction	--	--	4.0	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	16.0	
Diode Forward Voltage	V_{SD}	$I_S=4.0A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	T_{rr}	$I_S=4.0A, V_{GS}=0V,$	--	463.85	--	ns
Reverse Recovery Charge	Q_{rr}	$di_F/dt=100A/\mu s$ (Note 2)	--	2.16	--	μC

Notes:

1. $L=30mH, I_{AS}=3.72A, V_{DD}=100V, R_G=25\Omega$, starting $T_{BJB}=25^\circ C$;
2. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

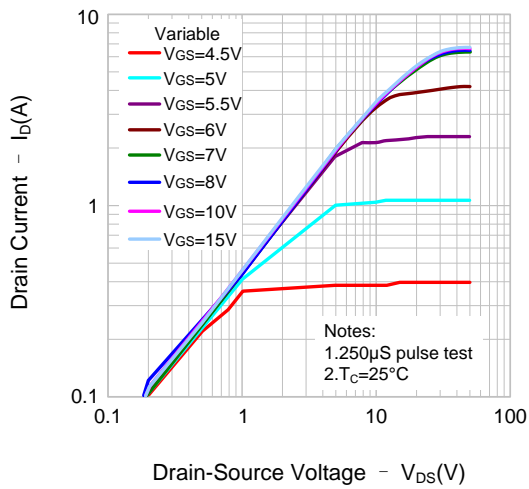


Figure 2. Transfer Characteristics

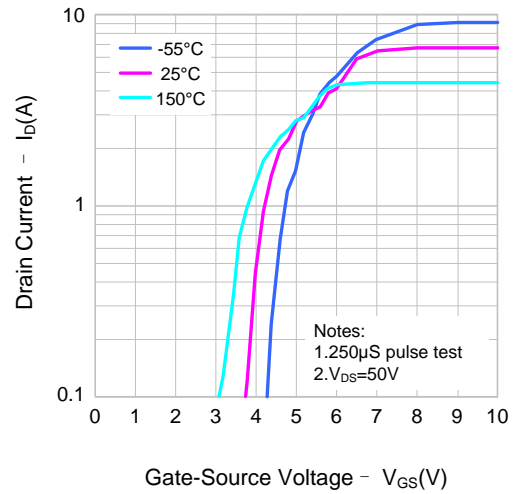


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

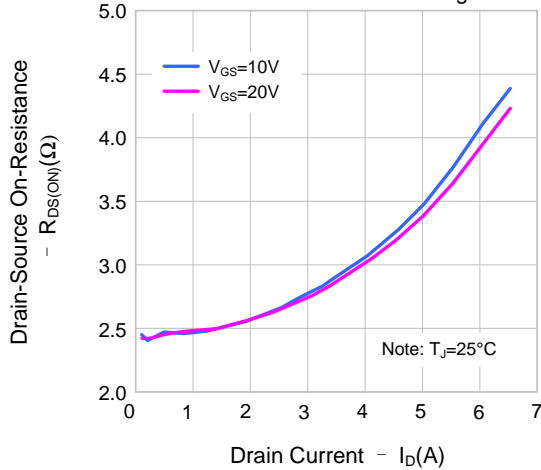


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

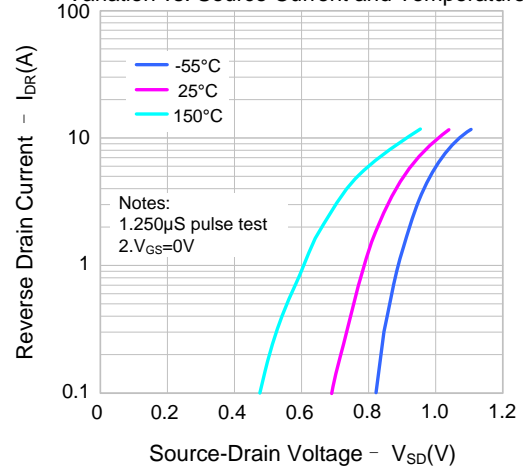


Figure 5. Capacitance Characteristics

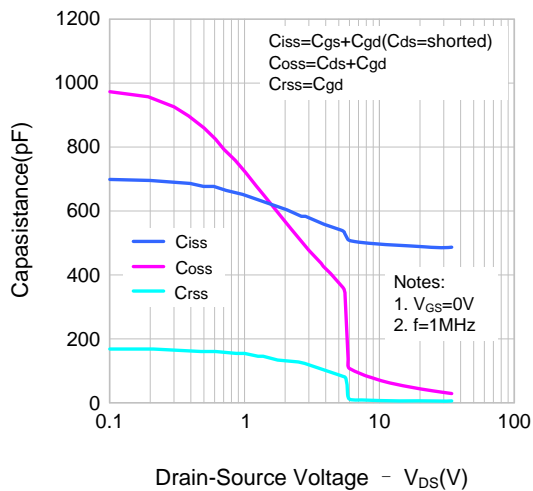
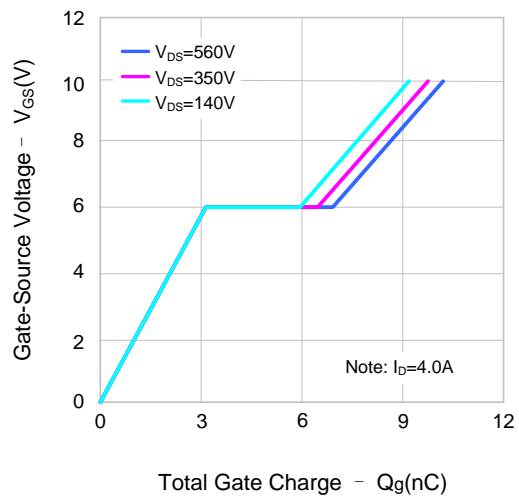


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS(CONTINUED)

Figure 7. Breakdown Voltage Variation vs. Temperature

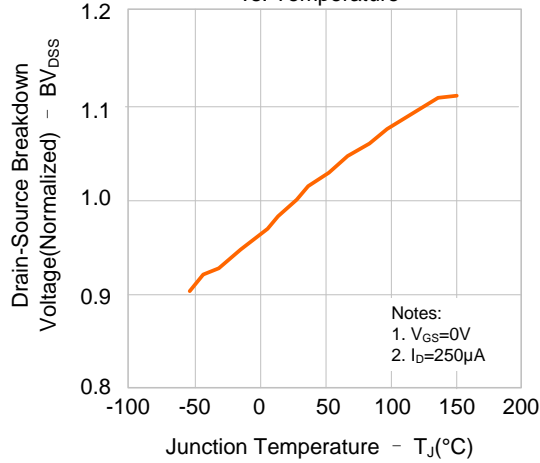


Figure 8. On-resistance Variation vs. Temperature

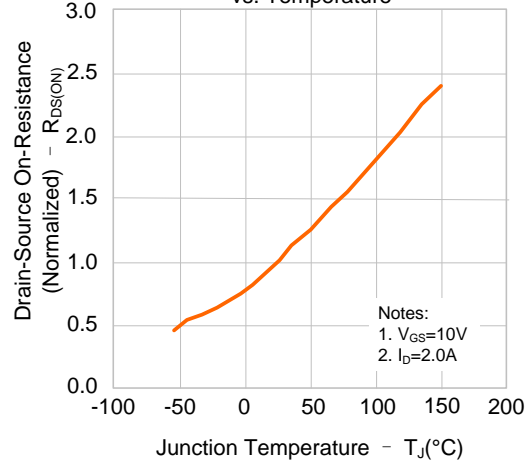


Figure 9-1. Max. Safe Operating Area(SVF4N70F)

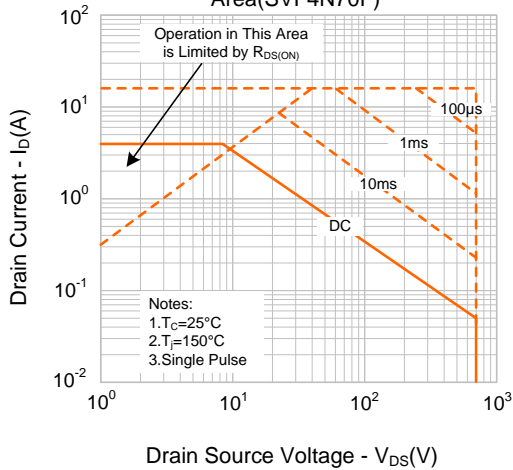


Figure 9-1. Max. Safe Operating Area(SVF4N70D)

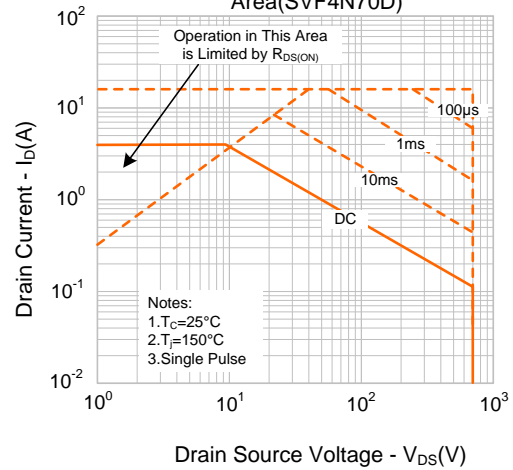
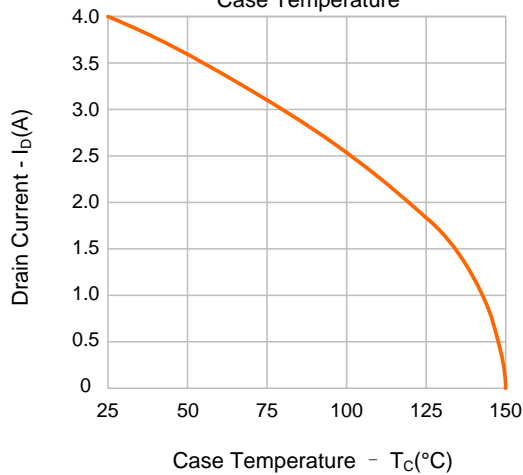
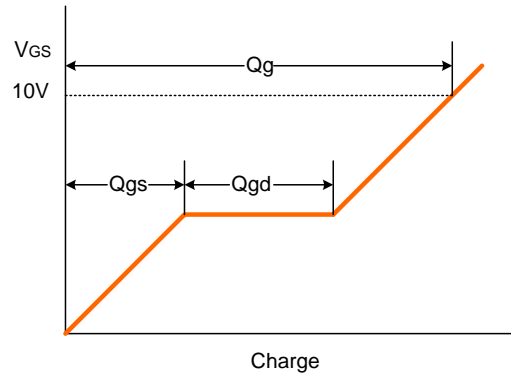
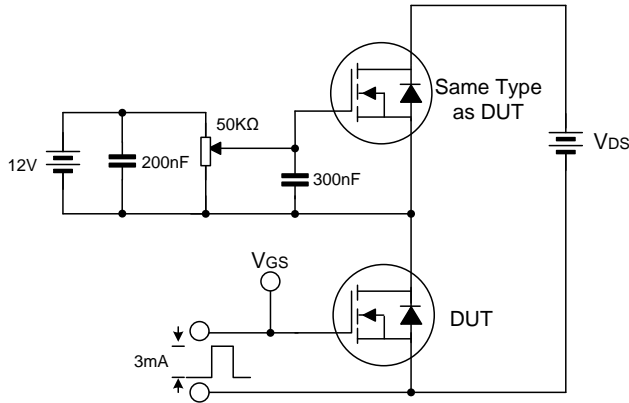


Figure 10. Maximum Drain Current vs. Case Temperature

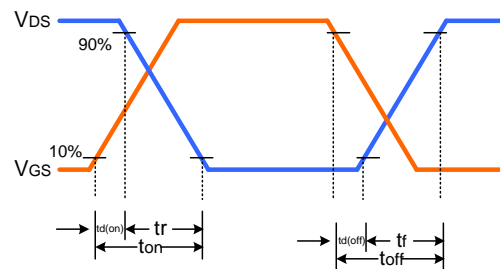
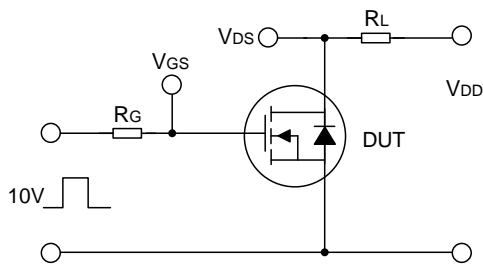


TYPICAL TEST CIRCUIT

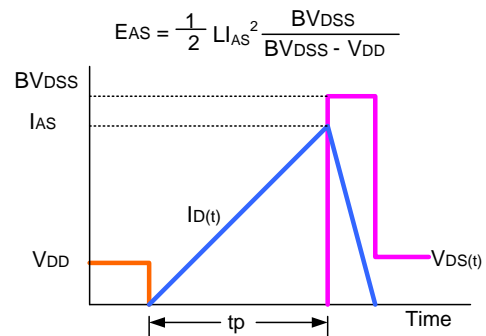
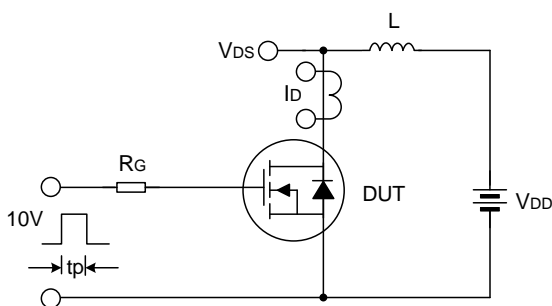
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

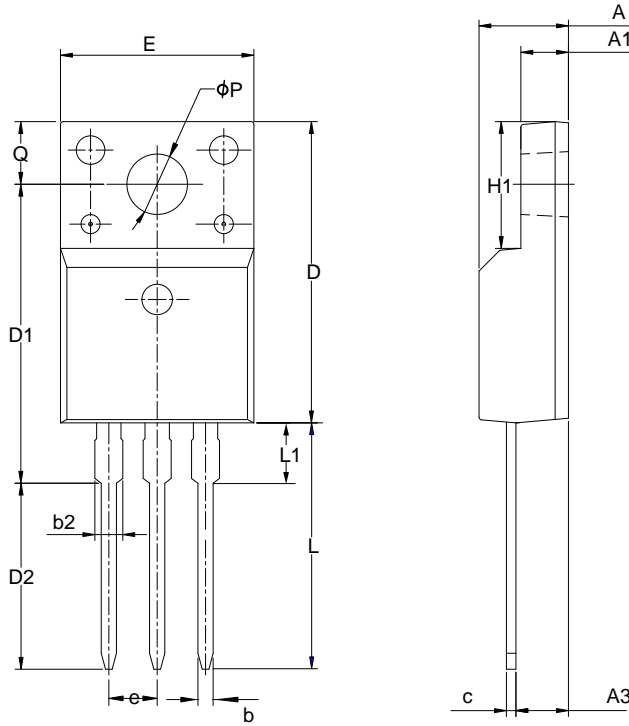


Unclamped Inductive Switching Test Circuit & Waveform



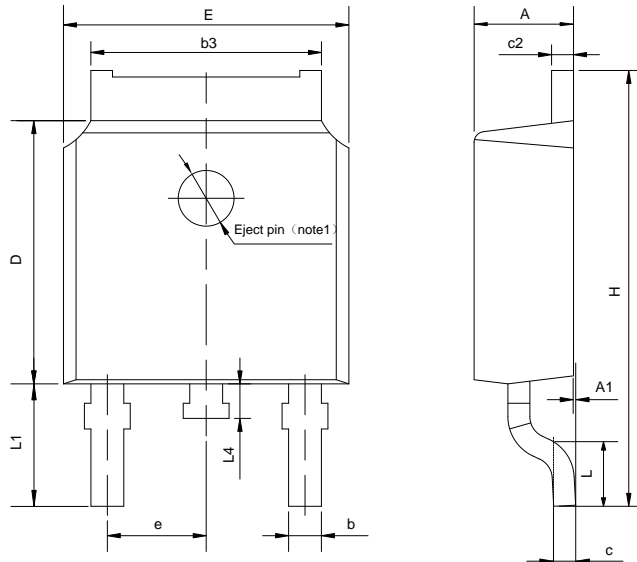
PACKAGE OUTLINE

TO-220F-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	—	—	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	—	—	3.50
phi P	3.00	3.18	3.40
Q	3.05	3.30	3.55

TO-252-2L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.10	2.30	2.50
A1	0	—	0.127
b	0.66	0.76	0.89
b3	5.10	5.33	5.46
c	0.45	—	0.65
c2	0.45	—	0.65
D	5.80	6.10	6.40
E	6.30	6.60	6.90
e	2.30TYP		
H	9.60	10.10	10.60
L	1.40	1.50	1.70
L1	2.90REF		
L4	0.60	0.80	1.00

NOTE1 : There are two conditions for this position:has an eject pin or has no eject pin.

Important notice :

- The instructions are subject to change without notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- Our products are consumer electronic products, and / or civil electronic products.
- When using our products, please do not exceed the maximum rating of the products, otherwise the reliability of the whole machine will be affected. There is a certain possibility of failure or malfunction of any semiconductor product under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design, sample and whole machine manufacturing, so as to avoid potential failure risk that may cause personal injury or property loss.
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- When exporting, using and reselling our products, buyer must comply with the international export control laws and regulations of China, the United States, the United Kingdom, the European Union and other countries & regions.
- Product promotion is endless, our company will wholeheartedly provide customers with better products!
- Website: <http://www.silan.com.cn>

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Rev.: 2.2

Revision History:

1. Deleted NOMENCLATURE
2. Modify Important notice

Rev.: 2.1

Revision History:

1. Delete Tube of TO-252-2L
2. Delete the package outline of TO-220F-3L

Rev.: 2.0

Revision History:

1. Modify the value of $R_{DS(on)}$, Update SOA(Figure 9-1)

Rev.: 1.9

Revision History:

1. Modify the package information of TO-220F-3L
2. Modify the package information of TO-252-2L

Rev.: 1.8

Revision History:

1. Modify the thermal characteristics

Rev.: 1.7

Revision History:

1. Modify the symbols of "Operation Junction Temperature Range" and "Storage Temperature Range"

Rev.: 1.6

Revision History:

1. Modify the ordering information

Rev.: 1.5

Revision History:

1. Change the schematic diagram of MOS

Rev.: 1.4

Revision History:

1. Add the package of TO-252-2L
-

Rev.: 1.3

Revision History:

1. Modify "PACKAGE OUTLINE"
-

Rev.: 1.2

Revision History:

1. Modify "SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS"
-

Rev.: 1.1

Revision History:

1. The package outline of TO-220F-3L(1) and TO-220F-3L(2) are changed.
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Rev.: 1.0

Revision History:

1. Original
-
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