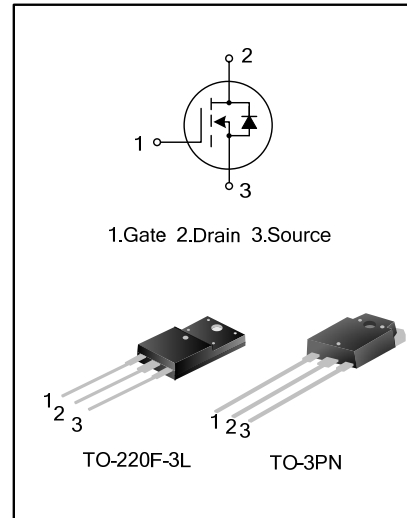


## 20A 500V N-CHANNEL MOSFET

### GENERAL DESCRIPTION

SVF20N50F/PN is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan proprietary F-Cell™ structure VDMOS technology. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

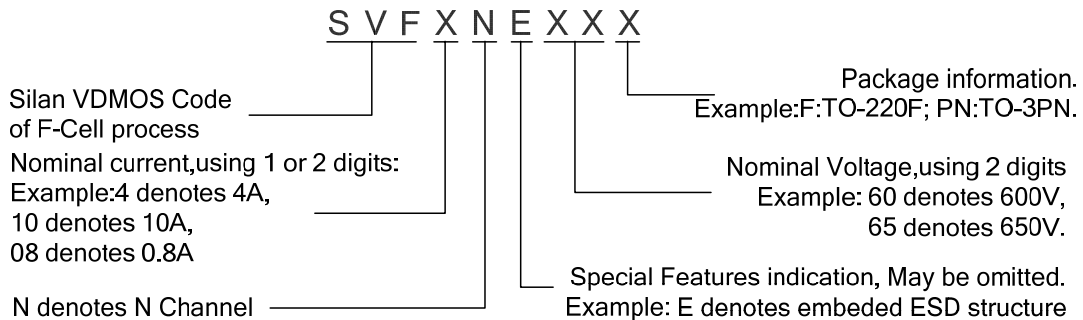
These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.



### FEATURES

- \* 20A, 500V,  $R_{DS(on)(typ)}=0.20\Omega@V_{GS}=10V$
- \* Low gate charge
- \* Low Crss
- \* Fast switching
- \* Improved dv/dt capability

### NOMENCLATURE



### ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SVF20N50F	TO-220F-3L	SVF20N50F	Pb free	Tube
SVF20N50PN	TO-3PN	20N50	Pb free	Tube

**ABSOLUTE MAXIMUM RATINGS** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Characteristics	Symbol	Rating		Unit
		SVF20N50F	SVF20N50PN	
Drain-Source Voltage	$V_{DS}$	500		V
Gate-Source Voltage	$V_{GS}$	$\pm 30$		V
Drain Current	$I_D$	$T_C=25^\circ\text{C}$		A
		$T_C=100^\circ\text{C}$		
Drain Current Pulsed	$I_{DM}$	80.0		A
Power Dissipation( $T_C=25^\circ\text{C}$ ) -Derate above $25^\circ\text{C}$	$P_D$	72	252	W
		0.58	2.02	W/ $^\circ\text{C}$
Single Pulsed Avalanche Energy (Note 1)	$E_{AS}$	1596		mJ
Operation Junction Temperature Range	$T_J$	$-55 \sim +150$		$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	$-55 \sim +150$		$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Rating		Unit
		SVF20N50F	SVF20N50PN	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.74	0.50	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	120	50	$^\circ\text{C}/\text{W}$

**ELECTRICAL CHARACTERISTICS** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain -Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	500	--	--	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=500\text{V}, V_{GS}=0\text{V}$	--	--	1.0	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30\text{V}, V_{DS}=0\text{V}$	--	--	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu\text{A}$	2.0	--	4.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=10.0\text{A}$	--	0.20	0.27	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=25\text{V}, V_{GS}=0\text{V},$ $f=1.0\text{MHz}$	--	2687.7	--	pF
Output Capacitance	$C_{oss}$		--	355.0	--	
Reverse Transfer Capacitance	$C_{rss}$		--	10.3	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=250\text{V}, R_G=10\Omega,$ $I_D=20.0\text{A}$  (Note 2, 3)	--	27.2	--	ns
Turn-on Rise Time	$t_r$		--	47.5	--	
Turn-off Delay Time	$t_{d(off)}$		--	78.7	--	
Turn-off Fall Time	$t_f$		--	41.1	--	
Total Gate Charge	$Q_g$	$V_{DD}=400\text{V}, V_{GS}=10\text{V},$ $I_D=20.0\text{A}$  (Note 2, 3)	--	49.50	--	nC
Gate-Source Charge	$Q_{gs}$		--	14.28	--	
Gate-Drain Charge	$Q_{gd}$		--	16.95	--	

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse P-N Junction Diode in the MOSFET	--	--	20.0	A
Pulsed Source Current	$I_{SM}$		--	--	80.0	
Diode Forward Voltage	$V_{SD}$	$I_S=20.0A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	$T_{rr}$	$I_S=20.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$ (Note 2)	--	570.3	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	7.35	--	$\mu C$

### Notes:

1.  $L=30mH, I_{AS}=9.9A, V_{DD}=50, R_G=25\Omega$ , starting  $T_J=25^\circ C$ ;
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

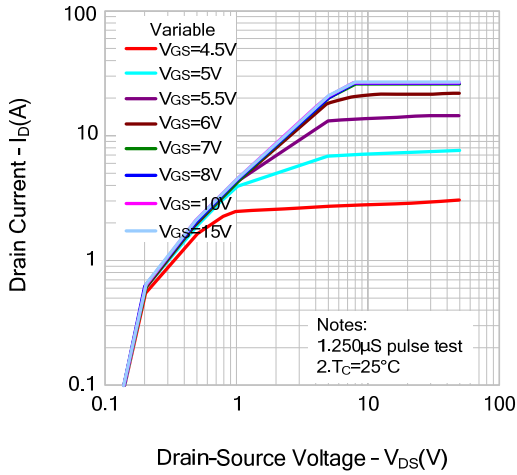


Figure 2. Transfer Characteristics

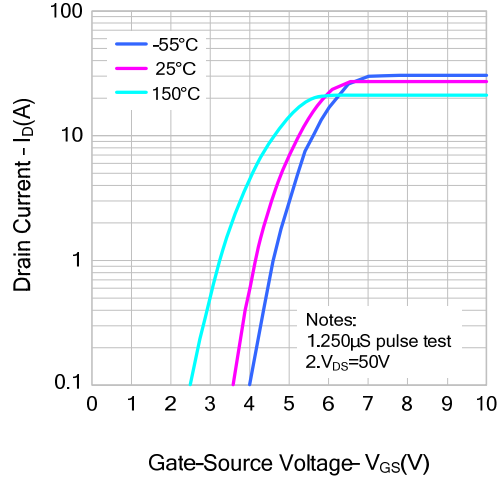


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

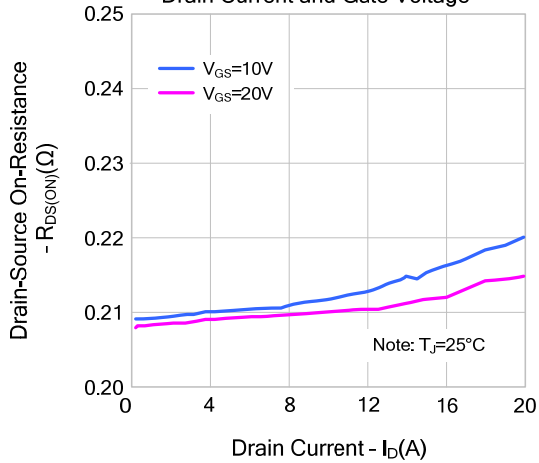


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

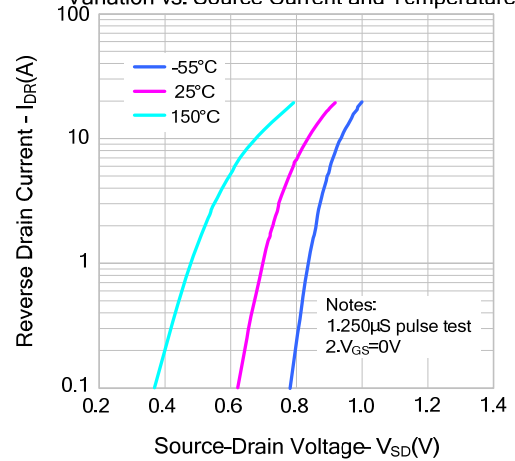


Figure 5. Capacitance Characteristics

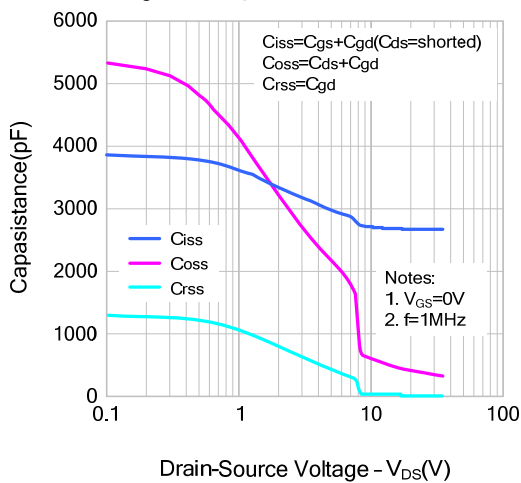
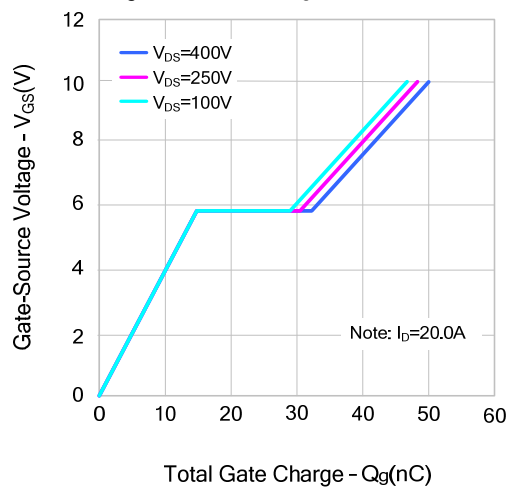
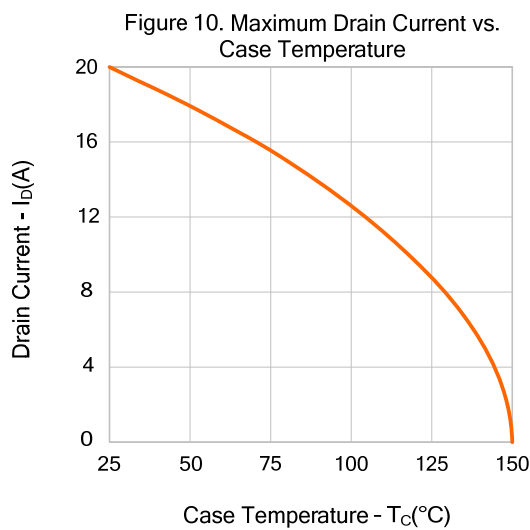
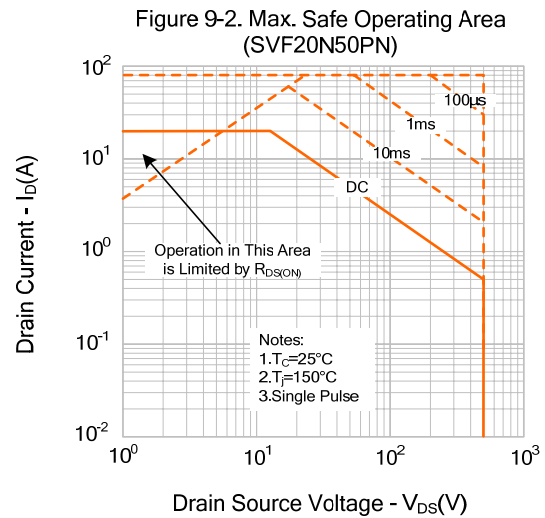
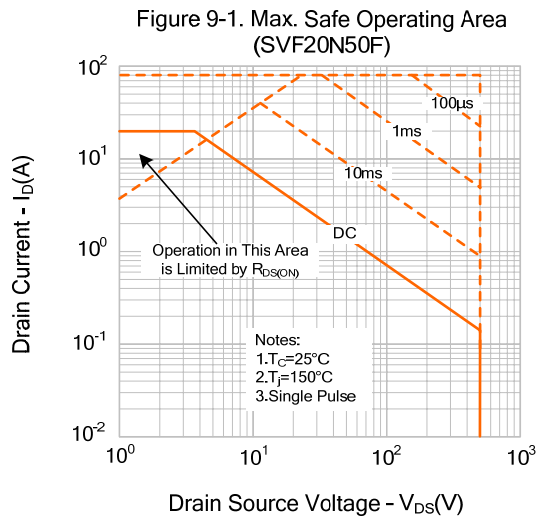
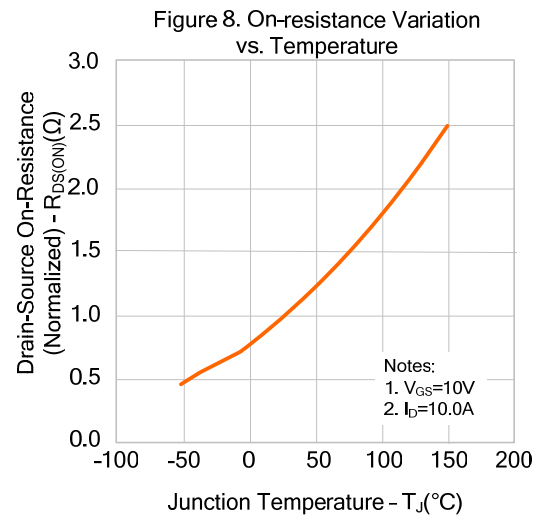
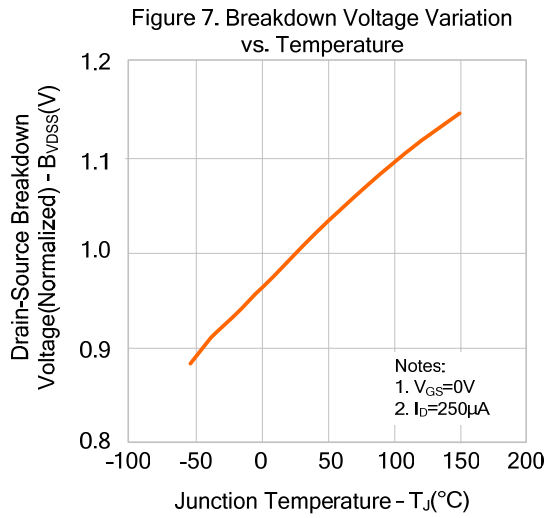


Figure 6. Gate Charge Characteristics

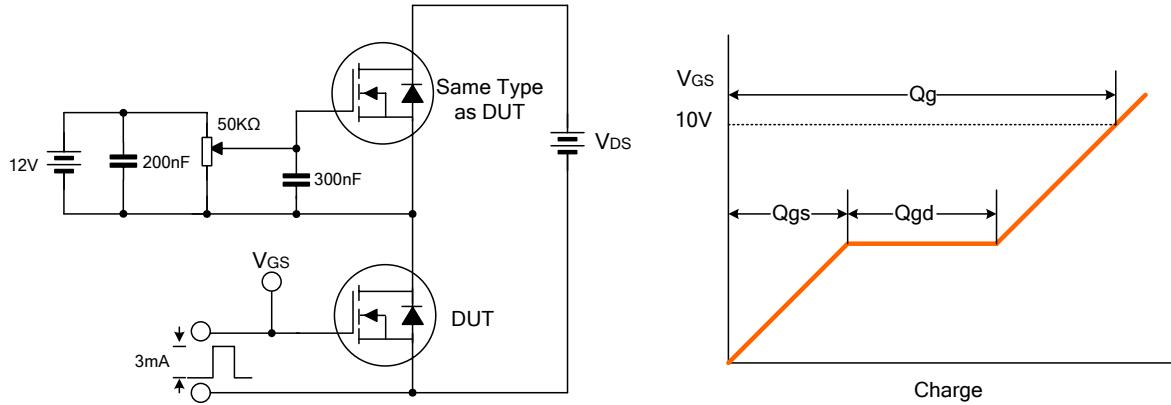


**TYPICAL CHARACTERISTICS (continued)**

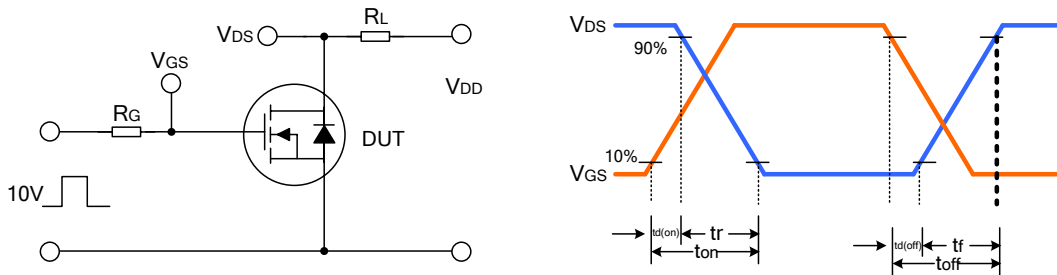


**TYPICAL TEST CIRCUIT**

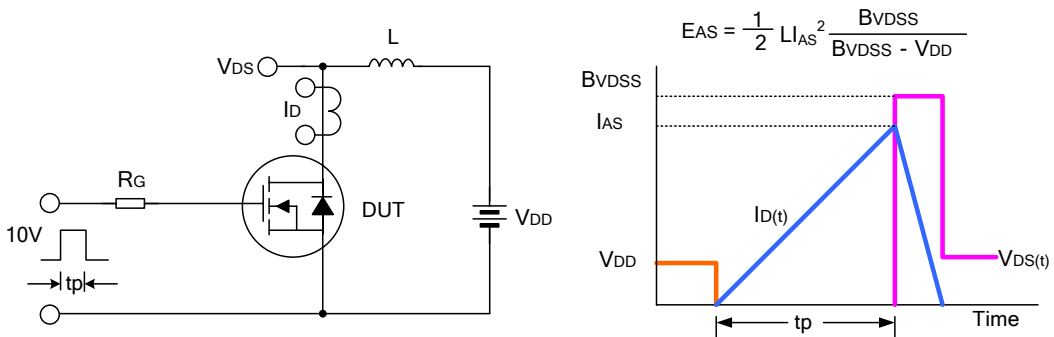
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



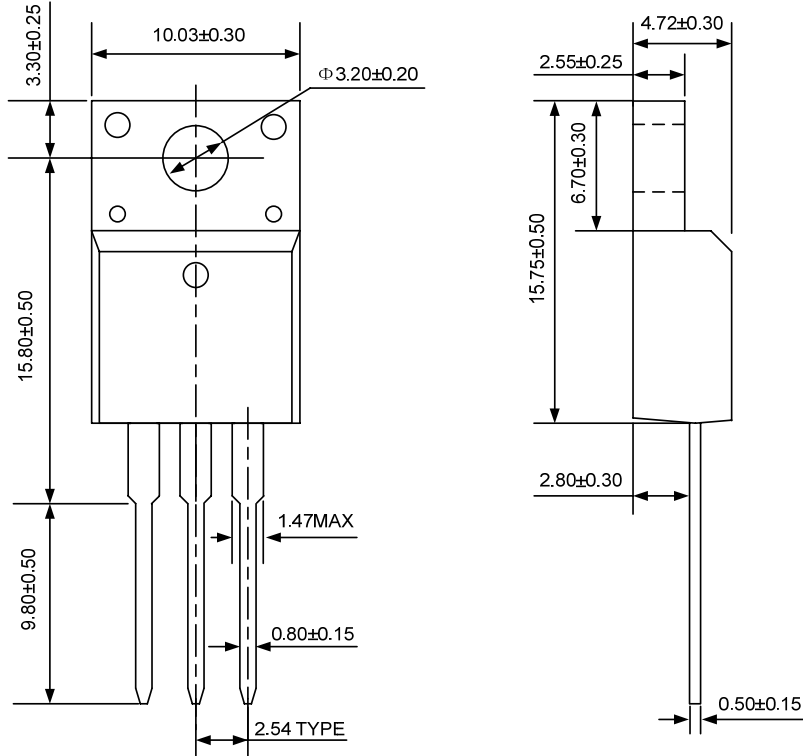
Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE**

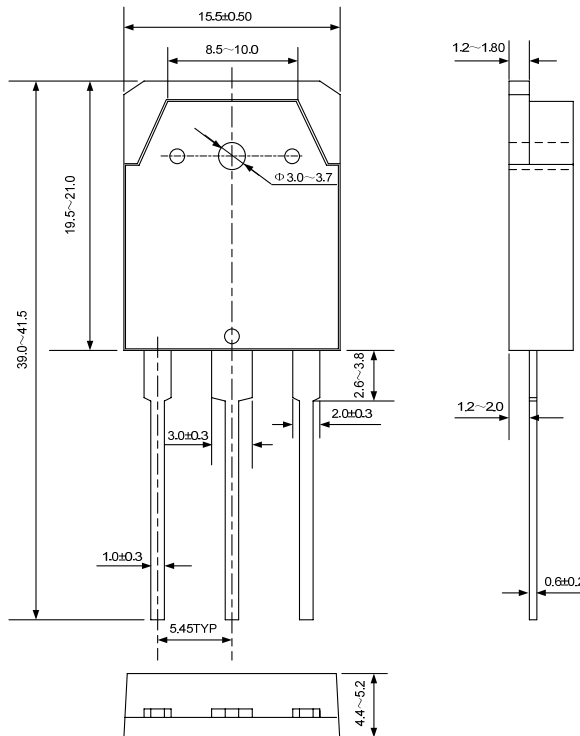
**TO-220F-3L**

**UNIT: mm**



**TO-3PN**

**UNIT: mm**





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- Silan will supply the best possible product for customers!

## ATTACHMENT

### Revision History

Date	REV	Description	Page
2011.06.05	1.0	Initial release	
2012.04.17	1.1	Add the package of TO-3PN; Modify "ELECTRICAL CHARACTERISTICS" and "TYPICAL CHARACTERISTICS"	