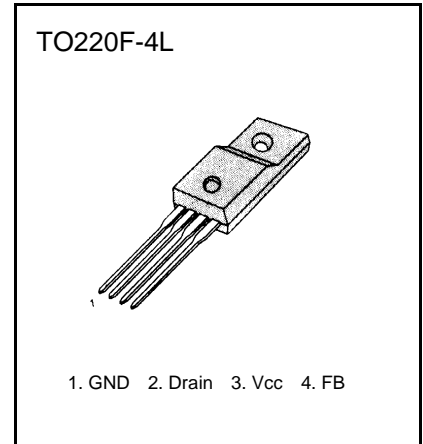


SPS

The SPS product family is specially designed for an off-line SMPS with minimal external components. The SPS consist of high voltage power SenseFET and current mode PWM IC.

Included PWM controller features integrated fixed frequency oscillator, under voltage lock-out, leading edge blanking, optimized gate turn-on/turn-off driver, thermal shutdown protection, over voltage protection, and temperature compensated precision current sources for loop compensation and fault protection circuitry. Compared to discrete MOSFET and PWM controller or RCC solution, a SPS can reduce total component count, design size, weight and at the same time increase efficiency, productivity, and system reliability.

It has a basic platform well suited for cost-effective design in either a flyback converter or a forward converter.



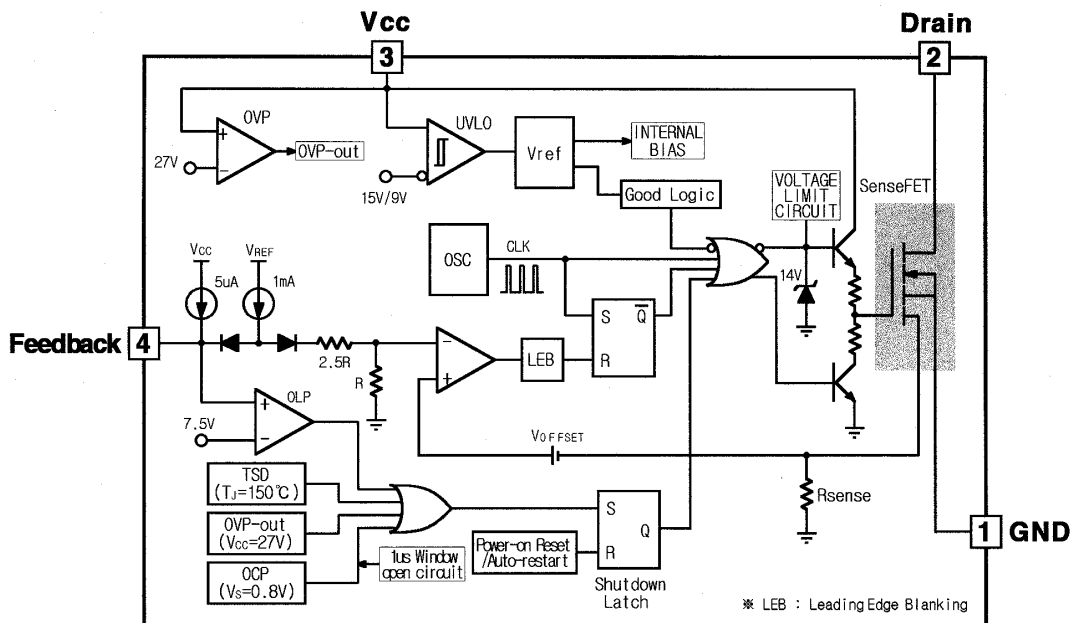
FEATURES

- Precision fixed operating frequency (70kHz)
- Low start-up current (typ. 100µA)
- Pulse by pulse current limiting
- Over current protection
- Over voltage protection (Min. 25V)
- Internal thermal shutdown function
- Under voltage lockout
- Internal high voltage sense FET
- Auto-restart mode

ORDERING INFORMATION

Device	Package	Operating Temp.
KA5M0380R	TO220F-4L	-25°C to +85°C

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Drain-source(GND) voltage ⁽¹⁾	V _{DSS}	800	V
Drain-gate voltage (R _{GS} =1M Ω)	V _{DGR}	800	V
Gate-source(GND) voltage	V _{GS}	\pm 30	V
Drain current pulsed ⁽²⁾	I _{DM}	12	A _{DC}
Single pulsed avalanch energy ⁽³⁾	E _{AS}	95	mJ
Avalanch current ⁽⁴⁾	I _{AS}	-	A
Continuous drain current (T _c = 25°C)	I _D	3.0	A _{DC}
Continuous drain current (T _c = 100°C)	I _D	2.1	A _{DC}
Supply voltage	V _{CC}	30	V
Analog input voltage range	V _{FB}	-0.3 to V _{SD}	V
Total power dissipation	P _D (Watt H/S)	35	W
	Derating	0.28	W/°C
Operating temperature	T _{OPR}	-25 to +85	°C
Storage temperature	T _{STG}	-55 to +150	°C

NOTES :

1. T_j = 25°C to 150°C
2. Repetitive rating : Pulse width limited by maximum junction temperature
3. L = 51mH, starting T_j = 25°C
4. L = 13uH, starting T_j = 25°C

ELECTRICAL CHARACTERISTICS (SFET part)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BVDSS	VGS=0V, ID=50μA	800	-	-	V
Zero gate voltage drain current	IDSS	VDS=Max., Rating, VGS=0V	-	-	250	μA
		VDS=0.8Max., Rating, VGS=0V, TC=125°C	-	-	1000	μA
Static drain-source on resistance ^(note)	RDS(on)	VGS=10V, ID=0.5A	-	4	5	Ω
Forward transconductance ^(note)	gfs	VDS=50V, ID=0.5A	1.5	2.5	-	mho
Input capacitance	Ciss	VGS=0V, VDS=25V, f = 1MHz	-	779	-	pF
Output capacitance	Coss		-	75.6	-	
Reverse transfer capacitance	Crss		-	24.9	-	
Turn on delay time	td(on)	VDD=0.5BVDSS, ID=1.0A (MOSFET switching time are essentially independent of operating temperature)	-	40	-	nS
Rise time	tr		-	95	-	
Turn off delay time	td(off)		-	150	-	
Fall time	tf		-	60	-	
Total gate charge (gate-source+gate-drain)	Qg	VGS=10V, ID=1.0A, VDS=0.5BVDSS(MOSFET Switching time are Essentially independent of Operating temperature)	-	-	34	nC
Gate-source charge	Qgs		-	7.2	-	
Gate-drain (Miller) charge	Qgd		-	12.1	-	

NOTE: Pulse test: Pulse width ≤ 300μS, duty ≤ 2%

ELECTRICAL CHARACTERISTICS (Control part)

(Ta = 25°C unless otherwise specified)

Characteristic	Symbol	Test condition	Min.	Typ.	Max.	Unit
REFERENCE SECTION						
Output voltage ⁽¹⁾	Vref	Ta=25°C	4.80	5.00	5.20	V
Temperature Stability ⁽¹⁾⁽²⁾	Vref/ΔT	-25°C ≤ Ta ≤ +85°C	-	0.3	0.6	mV/°C
OSCILLATOR SECTION						
Initial accuracy	Fosc	Ta=25°C	61	67	73	kHz
Frequency change with temperature ⁽²⁾		-25°C ≤ Ta ≤ +85°C	-	±5	±10	%
PWM SECTION						
Maximum duty cycle	Dmax	-	74	77	80	%
FEEDBACK SECTION						
Feedback source current	IFB	Ta=25°C, 0V ≤ Vfb ≤ 3V	0.7	0.9	1.1	mA
Shutdown delay current	Idealy	Ta=25°C, 5V ≤ Vfb ≤ VSD	4	5	6	mA
OVER CURRENT PROTECTION SECTION						
Over current protection	IL(max)	Max. inductor current	1.89	2.15	2.41	A
UVLO SECTION						
Start threshold voltage	Vth(H)	-	8.4	9	9.6	V
Minimum operating voltage	Vth(L)	After turn on	14	15	16	V
TOTAL STANDBY CURRENT SECTION						
Start current	IST	Vcc = 14V	-	0.1	0.17	mA
Operating supply current (control part only)	IOPR	Vcc ≤ 28	-	7	12	mA
SHUTDOWN SECTION						
Shutdown Feedback voltage	VSD	Vfb ≥ 6.5V	6.9	7.5	8.1	V
Thermal shutdown temperature(Tj) ⁽¹⁾	TSD	-	140	160	-	°C
Over voltage protection voltage	VOVP	Vcc ≥ 24V	25	27	29	V

NOTE:

1. These parameters, although guaranteed, are not 100% tested in production
2. These parameters, although guaranteed, are tested in EDS(wafer test) process

TYPICAL PERFORMANCE CHARACTERISTICS(SFET part)

Fig 1. Output Characteristics

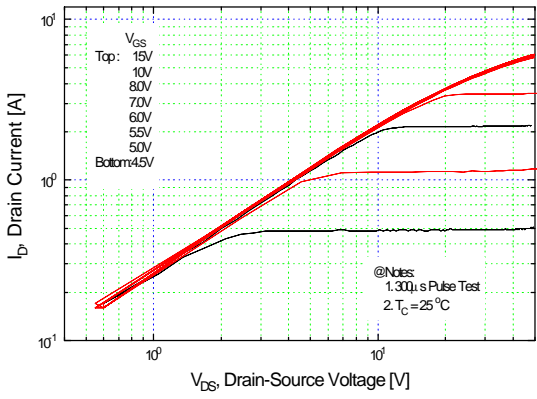


Fig. 2 Transfer Characteristics

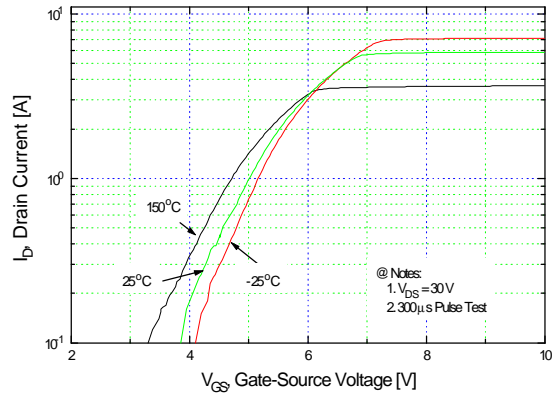


Fig. 3 On-Resistance vs. Drain Current

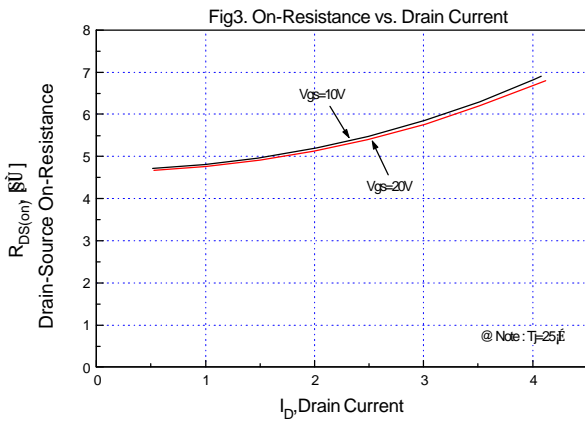


Fig. 4 Source-Drain Diode Forward Voltage

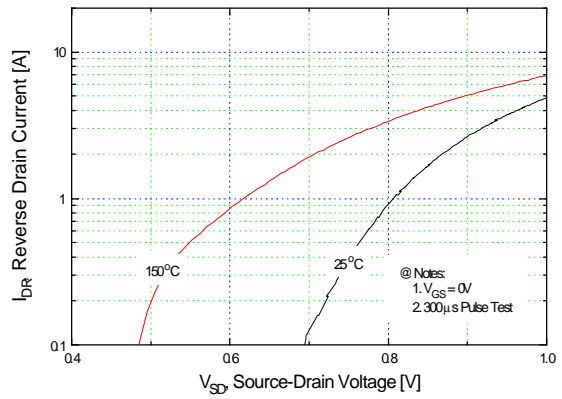


Fig.5 Capacitance vs. Drain-Source Voltage

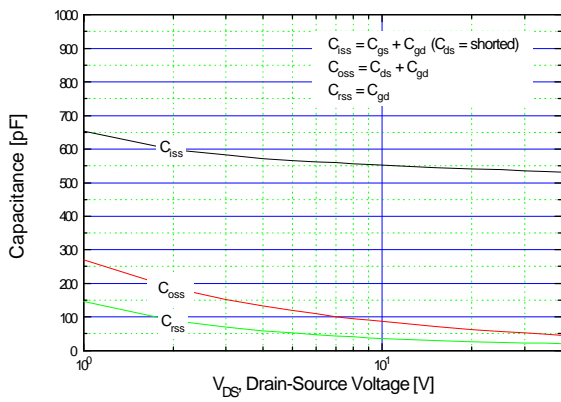
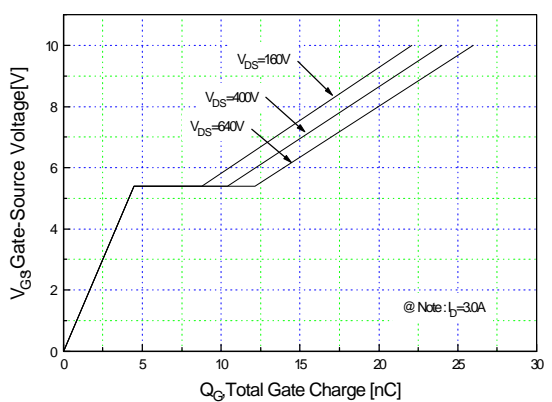


Fig. 6 Gate Charge vs. Gate-Source Voltage



TYPICAL PERFORMANCE CHARACTERISTICS(Continued)

Fig. 7 Breakdown Voltage vs. Temperature

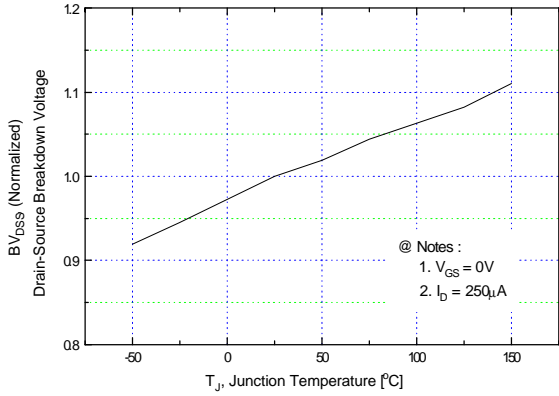


Fig. 8 On-Resistance vs. Temperature

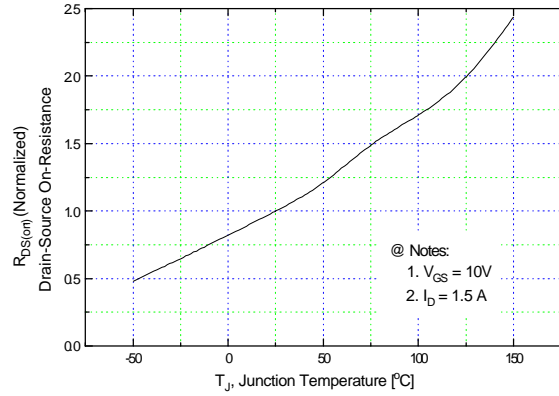


Fig. 9 Max. Safe Operating Area

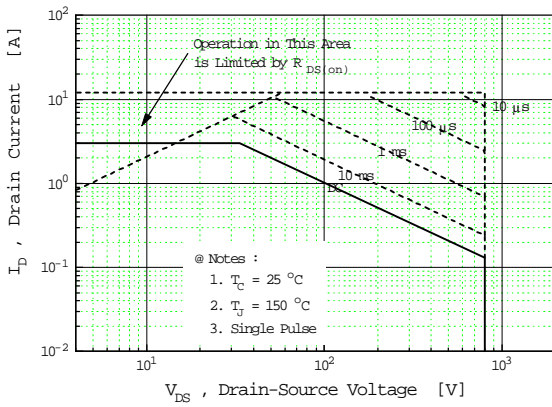


Fig. 10 Max. Drain Current vs. Case Temperature

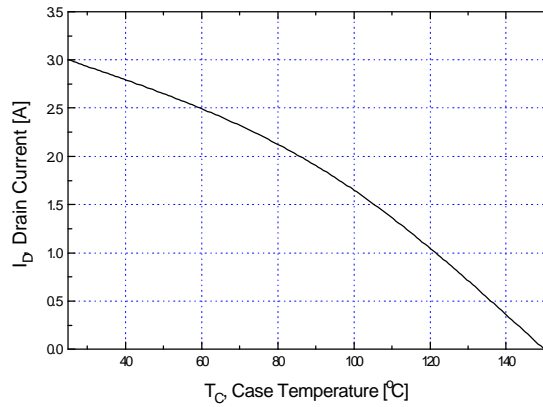
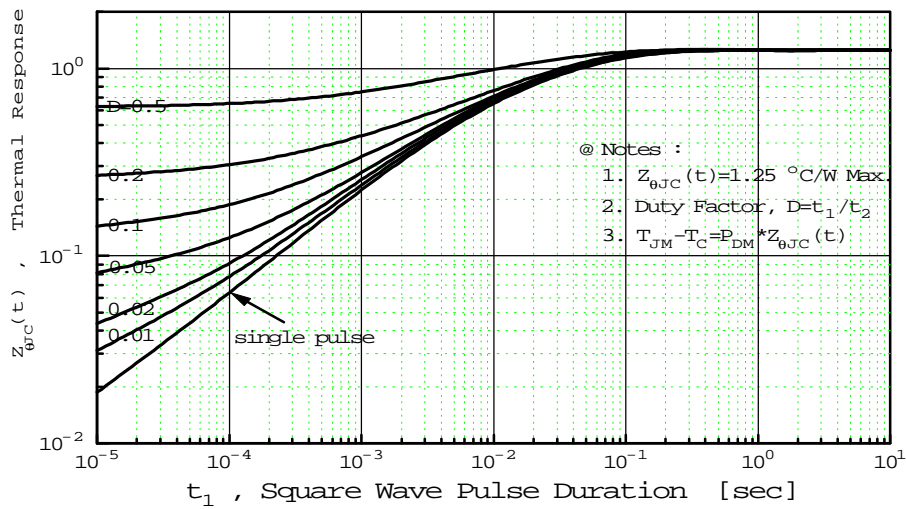
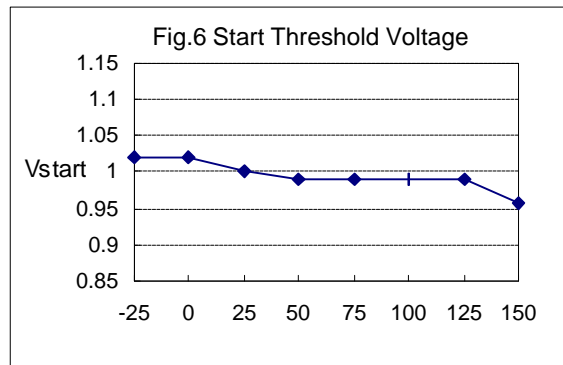
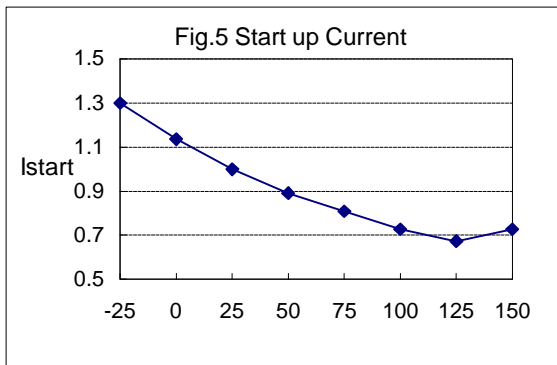
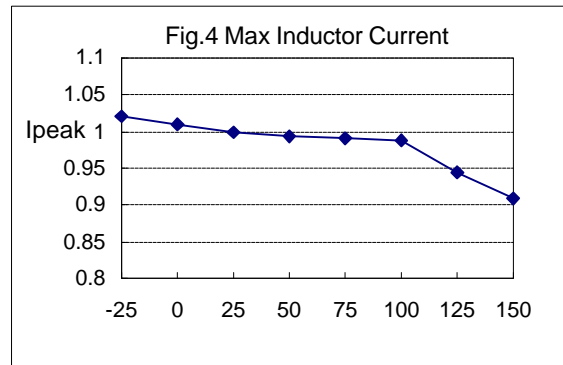
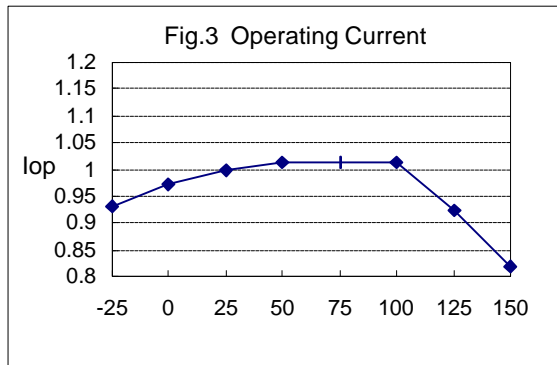
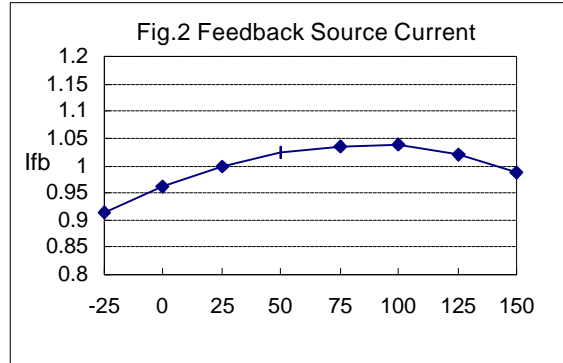
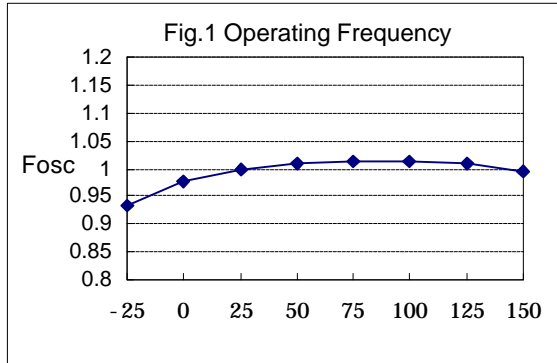


Fig. 11 Thermal Response

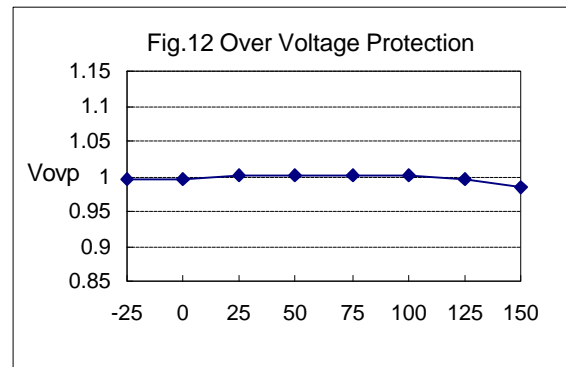
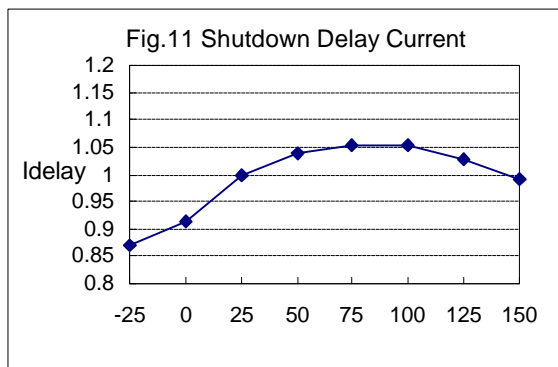
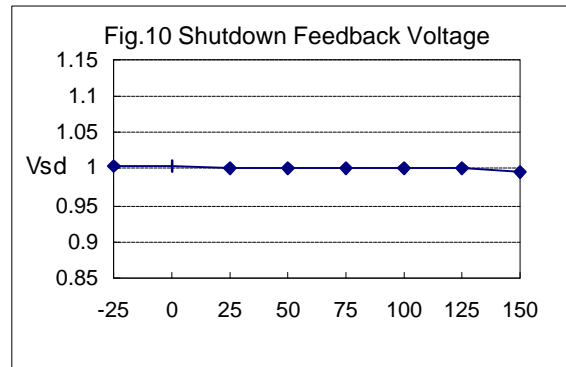
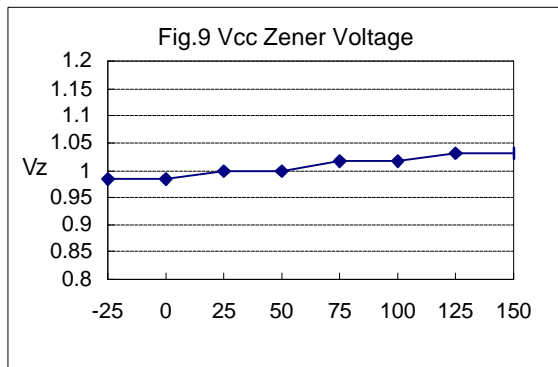
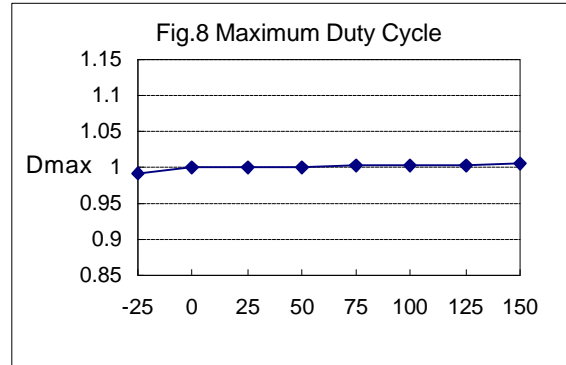
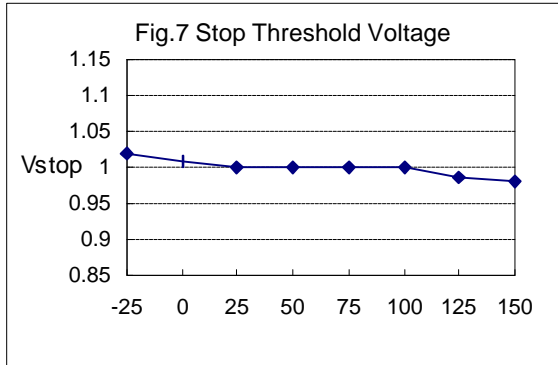


TYPICAL PERFORMANCE CHARACTERISTICS(Control part)



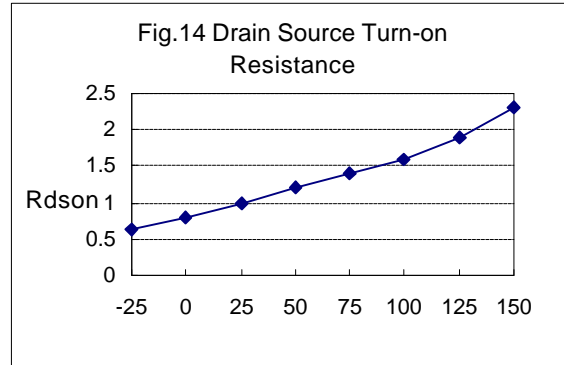
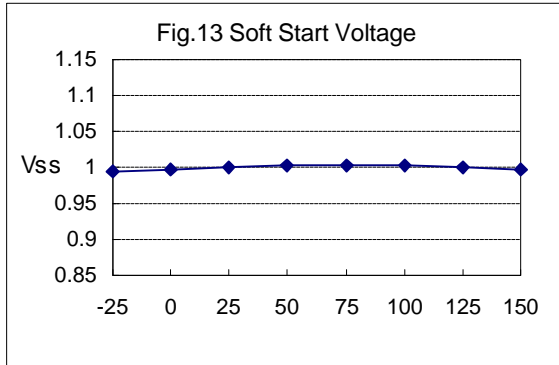
TYPICAL PERFORMANCE CHARACTERISTICS(Continued)

(These characteristic graphs are normalized at Ta = 25 °C)



TYPICAL PERFORMANCE CHARACTERISTICS(Continued)

(These characteristic graphs are normalized at Ta = 25 °C)



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