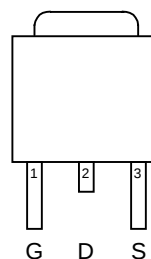


N-Channel Enhancement Mode MOSFET

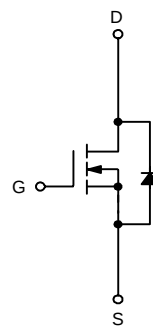
Features

- 25V/40A , $R_{DS(ON)}=9m\Omega(\text{typ.}) @ V_{GS}=10V$
 $R_{DS(ON)}=13m\Omega(\text{typ.}) @ V_{GS}=4.5V$
- Super High Dense Cell Design for Extremely Low $R_{DS(ON)}$
- Reliable and Rugged
- TO-252 Package

Pin Description



Top View of TO-252



N-Channel MOSFET

Applications

- Power Management in Computer, Portable Equipment and Battery Powered Systems.

Ordering and Marking Information

APM2512N □□-□□□ Lead Free Code Handling Code Temp. Range Package Code	Package Code U : TO-252 Operation Junction Temp. Range C : -55 to 150 °C Handling Code TR : Tape & Reel L : Lead Free Code L : Lead Free Device Blank : Original Device
APM2512N U : 	XXXXX - Date Code

Absolute Maximum Ratings $(T_A = 25^\circ\text{C unless otherwise noted})$

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage	25	V
V_{GS}	Gate-Source Voltage	± 20	

ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

Absolute Maximum Ratings (Cont.) (T_c= 25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
I _D	Maximum Drain Current – Continuous		40	A
I _{DM}	Maximum Pulsed Drain Current (pulse width ≤ 300μs)		90	
P _D	Maximum Power Dissipation	T _c =25°C	50	W
		T _c =100°C	20	
T _J ,T _{STG}	Maximum Operating and Storage Junction Temperature		-55 to 150	°C
R _{θJA} *	Thermal Resistance – Junction to Ambient		50	°C/W
R _{θJC}	Thermal Resistance – Junction to Case		2.5	

* Mounted on 1in² pad area of PCB.

Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	APM2512N			Unit
			Min.	Typ.	Max.	
Static						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _{DS} =250μA	25			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V , V _{GS} =0V			1	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	1.5	2	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V , V _{DS} =0V			±100	nA
R _{DS(ON)} ^a	Drain-Source On-state Resistance	V _{GS} =10V , I _{DS} =20A		9	12	mΩ
		V _{GS} =4.5V , I _{DS} =10A		13	20	
V _{SD} ^a	Diode Forward Voltage	I _{SD} =10A , V _{GS} =0V		0.9	1.3	V
Dynamic ^b						
Q _g	Total Gate Charge	V _{DS} =15V , I _{DS} = 10A V _{GS} =10V ,		28	38	nC
Q _{gs}	Gate-Source Charge			3.6		
Q _{gd}	Gate-Drain Charge			8.4		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =10V , I _{DS} =10A , V _{GEN} =10V , R _G =6Ω		10	20	ns
T _r	Turn-on Rise Time			15	25	
t _{d(OFF)}	Turn-off Delay Time			35	50	
T _f	Turn-off Fall Time			15	20	
C _{iss}	Input Capacitance	V _{GS} =0V		1560		pF
C _{oss}	Output Capacitance	V _{DS} =15V		345		
C _{rss}	Reverse Transfer Capacitance	Frequency=1.0MHz		245		

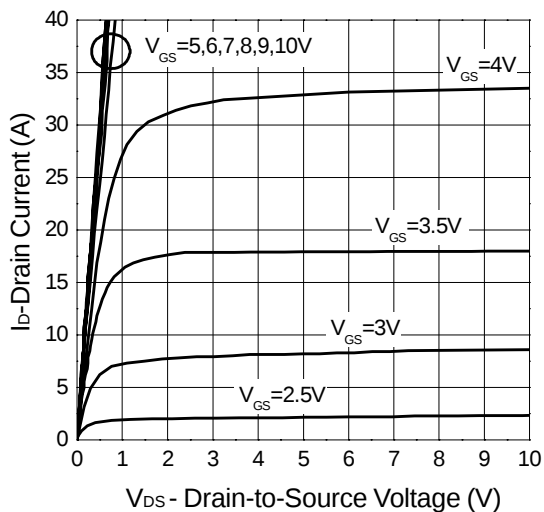
Notes

^a : Pulse test ; pulse width ≤300μs, duty cycle ≤ 2%

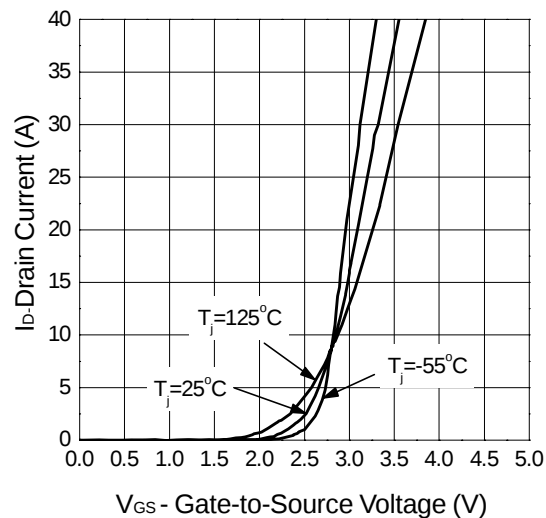
^b : Guaranteed by design, not subject to production testing

Typical Characteristics

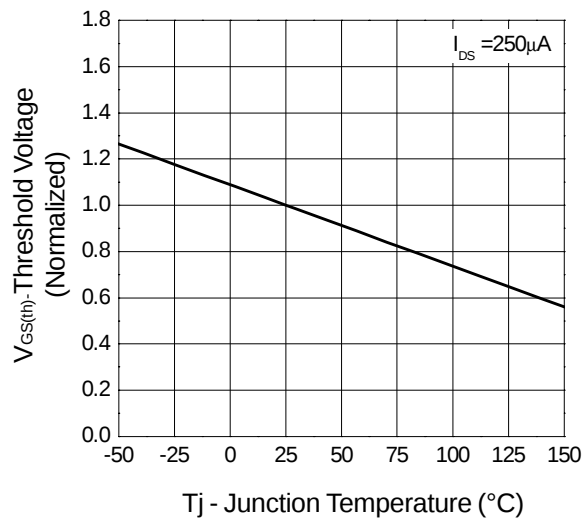
Output Characteristics



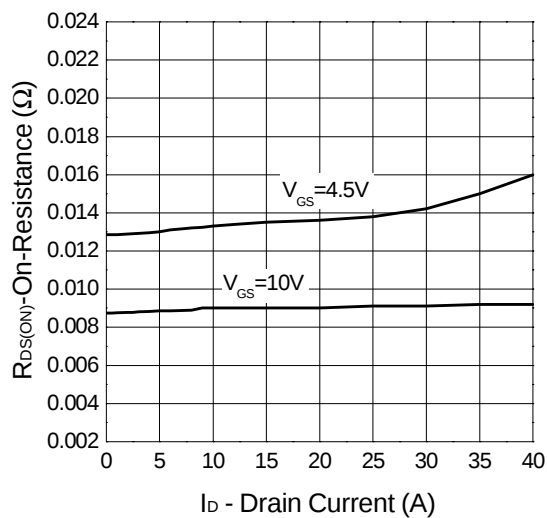
Transfer Characteristics



Threshold Voltage vs. Junction Temperature

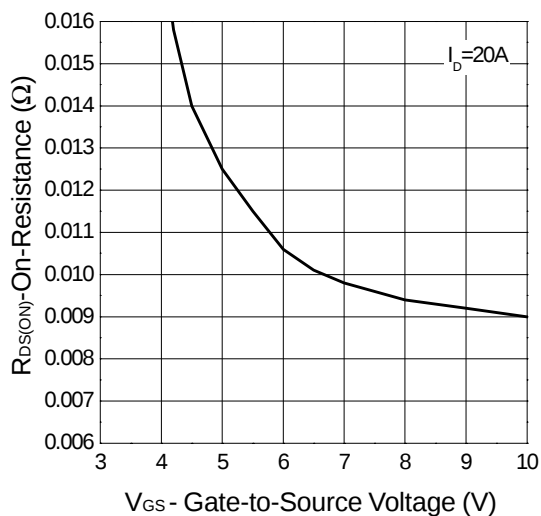


On-Resistance vs. Drain Current

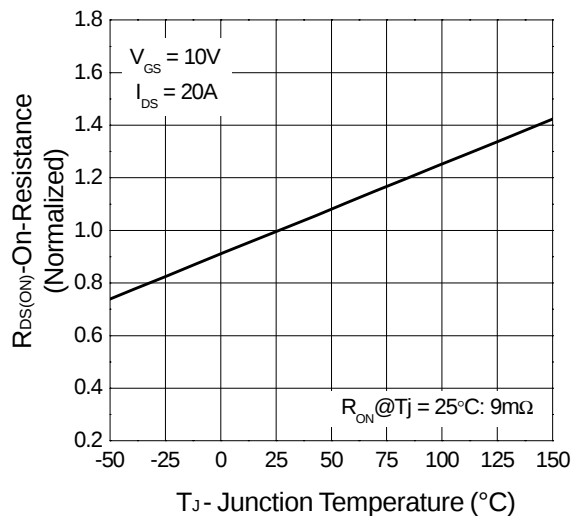


Typical Characteristics

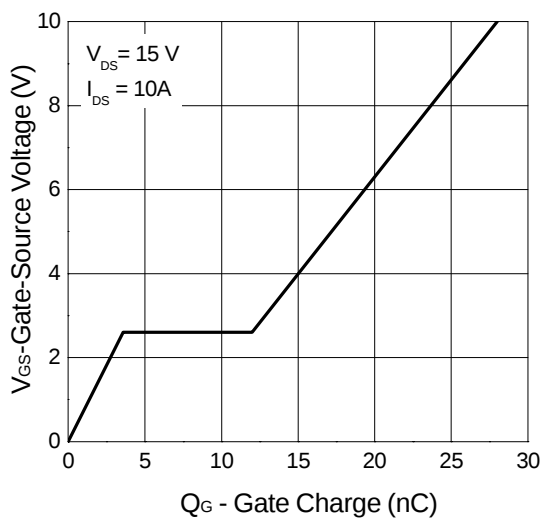
On-Resistance vs. Gate-to-Source Voltage



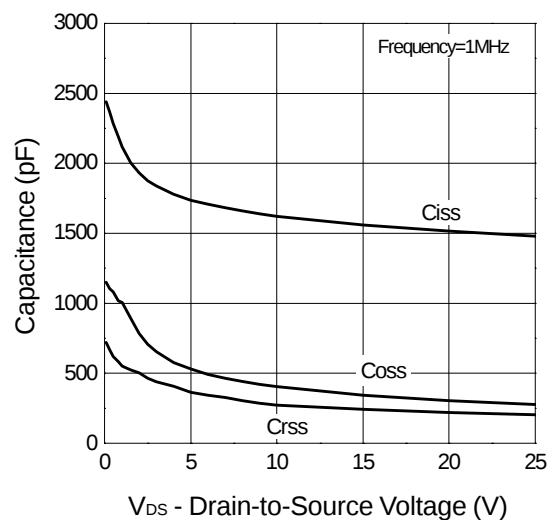
On-Resistance vs. Junction Temperature



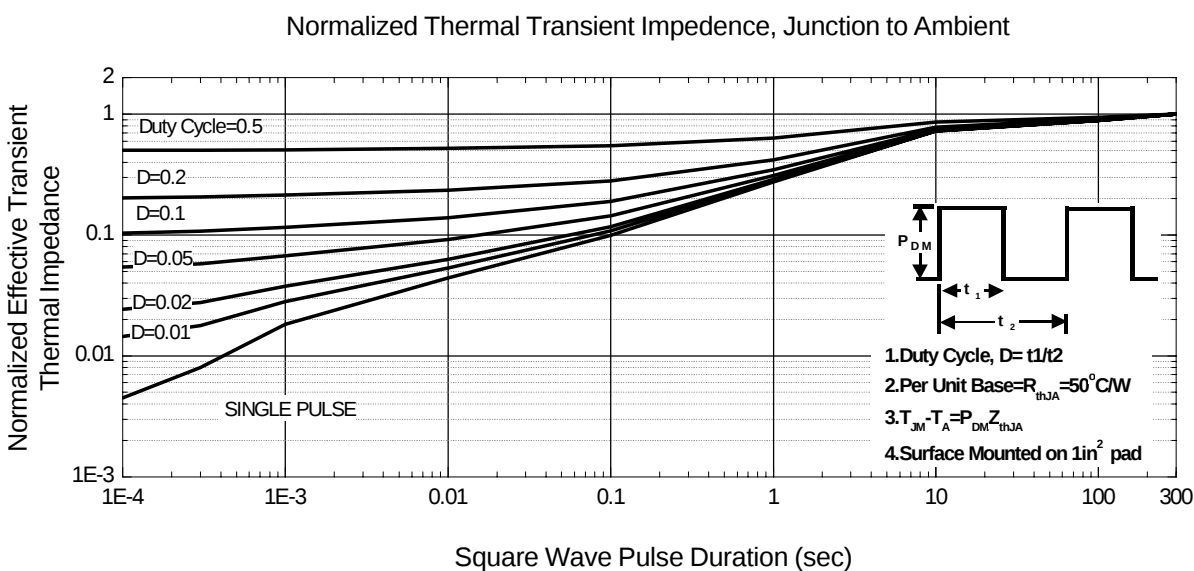
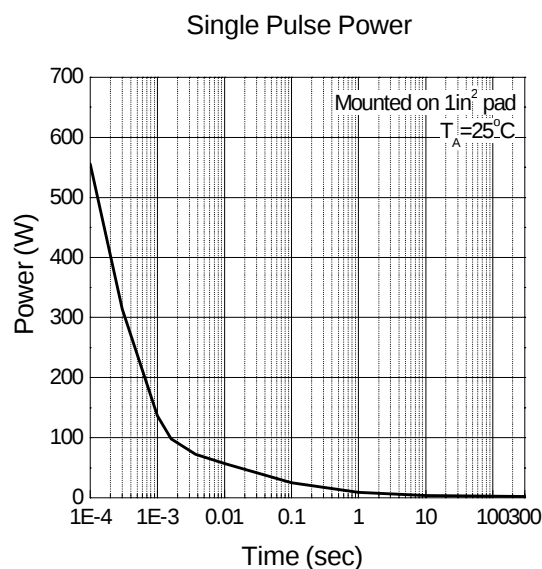
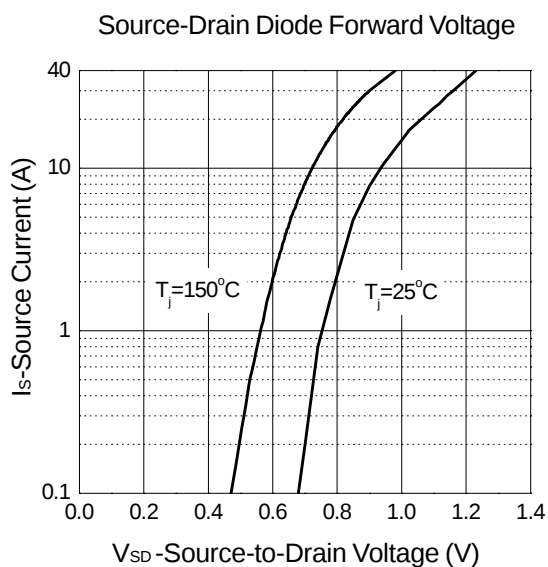
Gate Charge



Capacitance

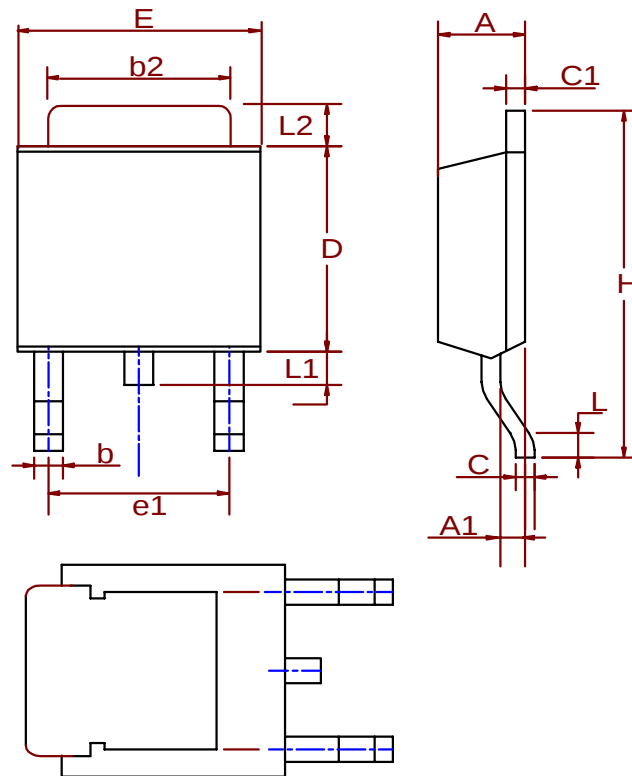


Typical Characteristics



Packaging Information

TO-252(Reference JEDEC Registration TO-252)

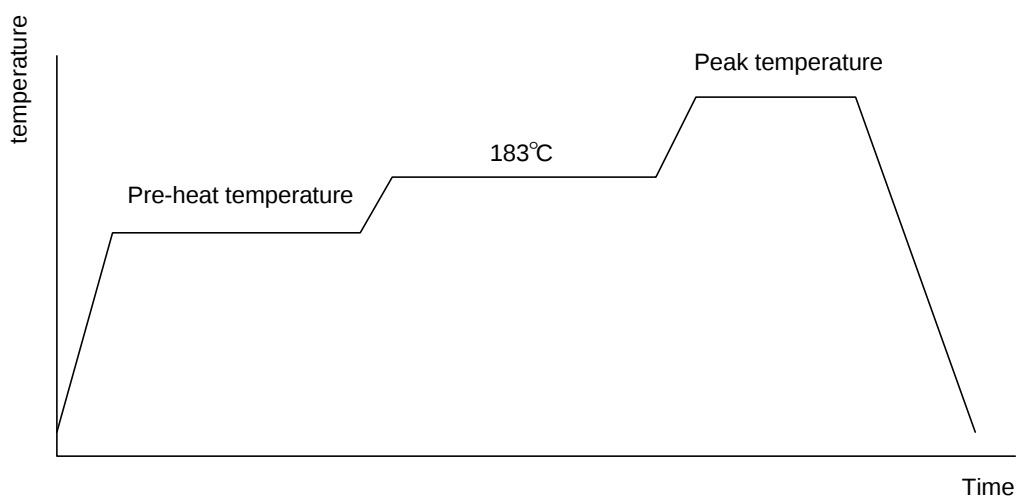


Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.18	2.39	0.086	0.094
A1	0.89	1.27	0.035	0.050
b	0.508	0.89	0.020	0.035
b2	5.207	5.461	0.205	0.215
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.334	6.22	0.210	0.245
E	6.35	6.73	0.250	0.265
e1	3.96	5.18	0.156	0.204
H	9.398	10.41	0.370	0.410
L	0.51		0.020	
L1	0.64	1.02	0.025	0.040
L2	0.89	2.032	0.035	0.080

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb)
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)



Classification Reflow Profiles

	Convection or IR/ Convection	VPR
Average ramp-up rate(183°C to Peak)	3°C/second max.	10 °C /second max.
Preheat temperature 125 ± 25°C)	120 seconds max	
Temperature maintained above 183°C	60 – 150 seconds	
Time within 5°C of actual peak temperature	10 – 20 seconds	60 seconds
Peak temperature range	220 +5/-0°C or 235 +5/-0°C	215-219°C or 235 +5/-0°C
Ramp-down rate	6 °C /second max.	10 °C /second max.
Time 25°C to peak temperature	6 minutes max.	

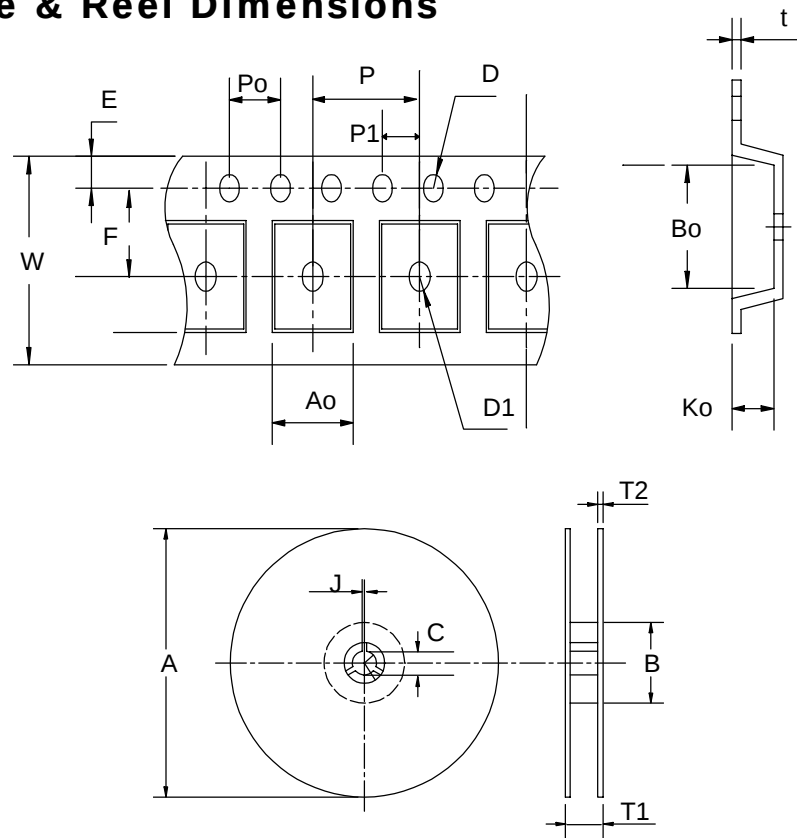
Package Reflow Conditions

pkg. thickness ≥ 2.5mm and all bgas	pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm ³	pkg. thickness < 2.5mm and pkg. volume < 350mm ³
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

Reliability test program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C, 5 SEC
HOLT	MIL-STD 883D-1005.7	1000 Hrs Bias @ 125°C
PCT	JESD-22-B, A102	168 Hrs, 100% RH, 121°C
TST	MIL-STD 883D-1011.9	-65°C ~ 150°C, 200 Cycles

Carrier Tape & Reel Dimensions



Application	A	B	C	J	T1	T2	W	P	E
TO-252	330 ± 3	100 ± 2	13 ± 0.5	2 ± 0.5	16.4 + 0.3 - 0.2	2.5 ± 0.5	16 + 0.3 - 0.1	8 ± 0.1	1.75 ± 0.1
	F	D	D1	P0	P1	A0	Bo	Ko	t
	7.5 ± 0.1	1.5 ± 0.1	1.5 ± 0.25	4.0 ± 0.1	2.0 ± 0.1	6.8 ± 0.1	10.4 ± 0.1	2.5 ± 0.1	0.3 ± 0.05

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
TO- 252	16	13.3	2500

Customer Service

Anpec Electronics Corp.

Head Office :

5F, No. 2 Li-Hsin Road, SBIP,

Hsin-Chu, Taiwan, R.O.C.

Tel : 886-3-5642000

Fax : 886-3-5642050

Taipei Branch :

7F, No. 137, Lane 235, Pac Chiao Rd.,

Hsin Tien City, Taipei Hsien, Taiwan, R. O. C.

Tel : 886-2-89191368

Fax : 886-2-89191369