

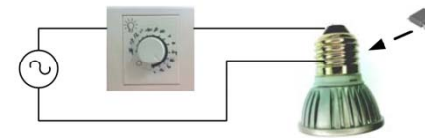


Dimmable LED Driver with iW3602

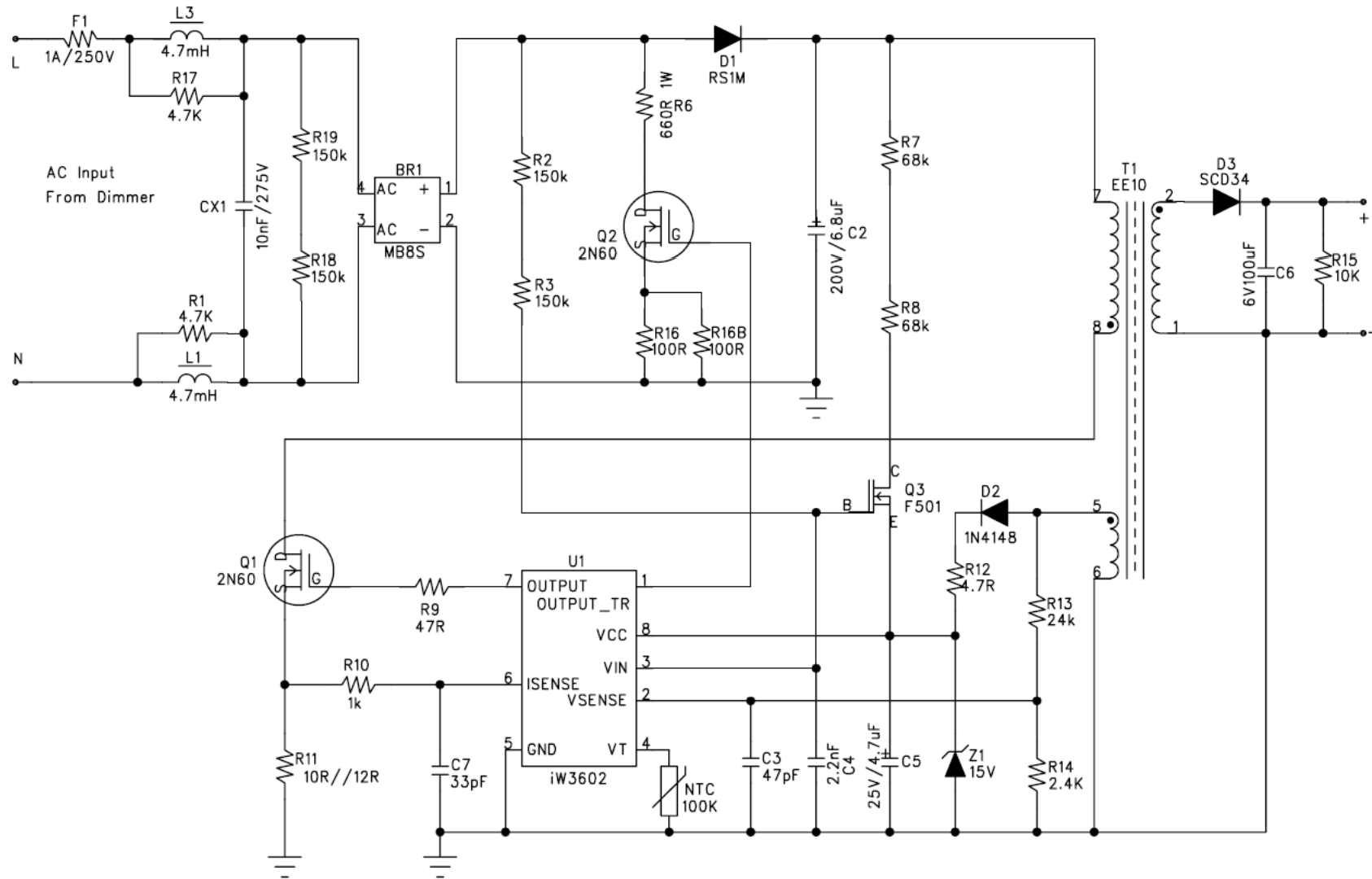
(Input 120Vac Output 4V900mA)

1.Design Purpose and Feature

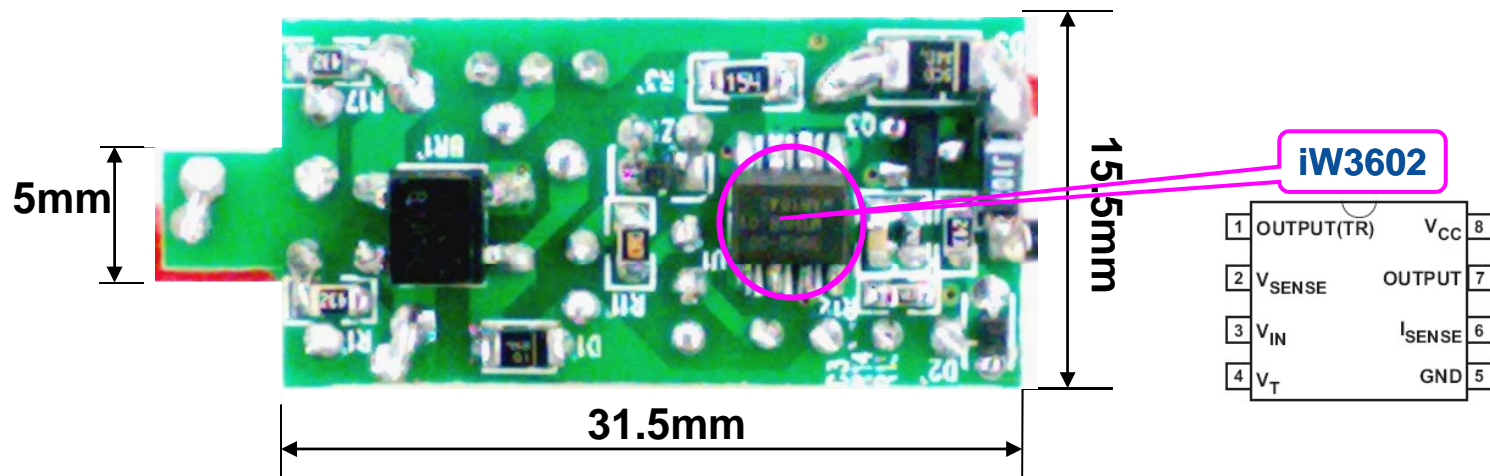
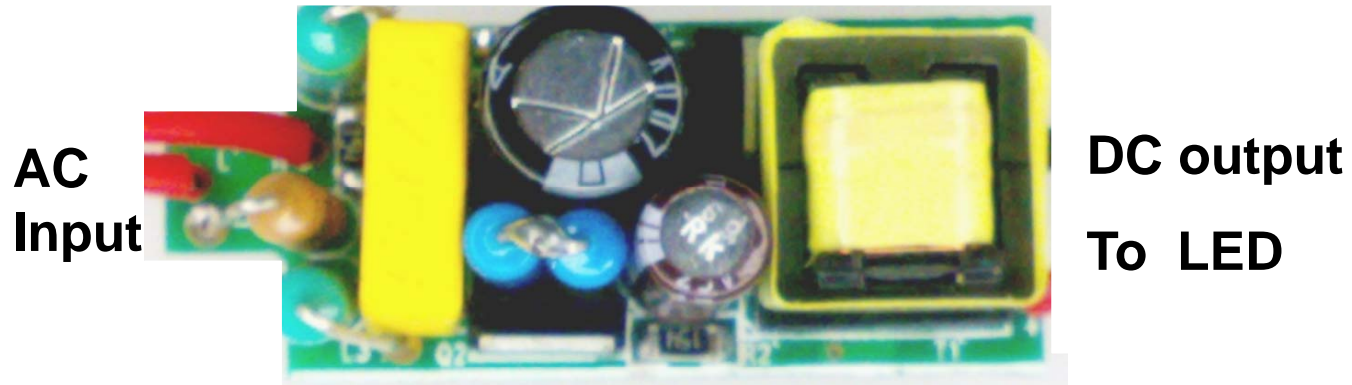
- Non-Isolated ac-dc offline Input 120Vac, Output 1 LEDs 900mA
- Intelligent wall dimmer detections
 - Leading-edge dimmer , Trailing-edge dimmer , No-dimmer
- Multiple dimming control scheme
 - Hybrid dimming scheme
 - PWM dimming scheme,900Hz
 - Amplitude dimming scheme
- Wide dimming range from 2% up to 100%
- No visible flicker
- Resonant control to achieve high efficiency
- High Power Factor, 0.6 without dimmer
- Temperature degrade control to adjust the LED
- Primary-only Sensing eliminates opto-isolator feedback and simplifies design



2.Schematics_Nominal Input at 120Vac_4V900mA

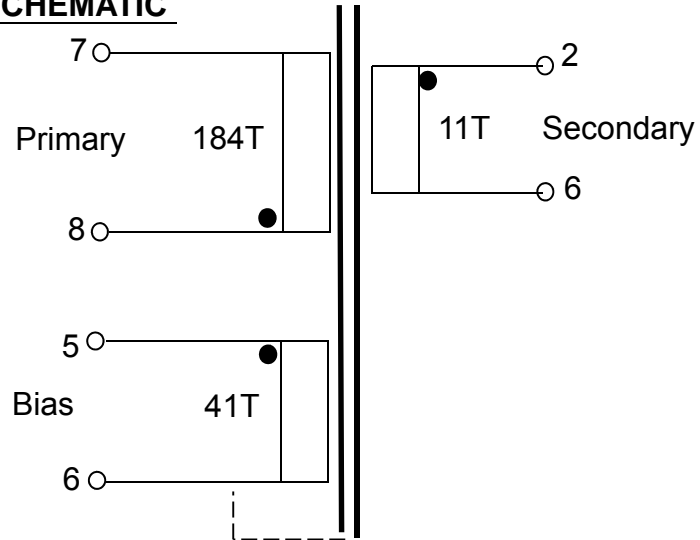


3.PCB Layout



4. Transformer Design_4V900mA_120Vac

SCHEMATIC



ELECTRICAL SPECIFICATIONS:

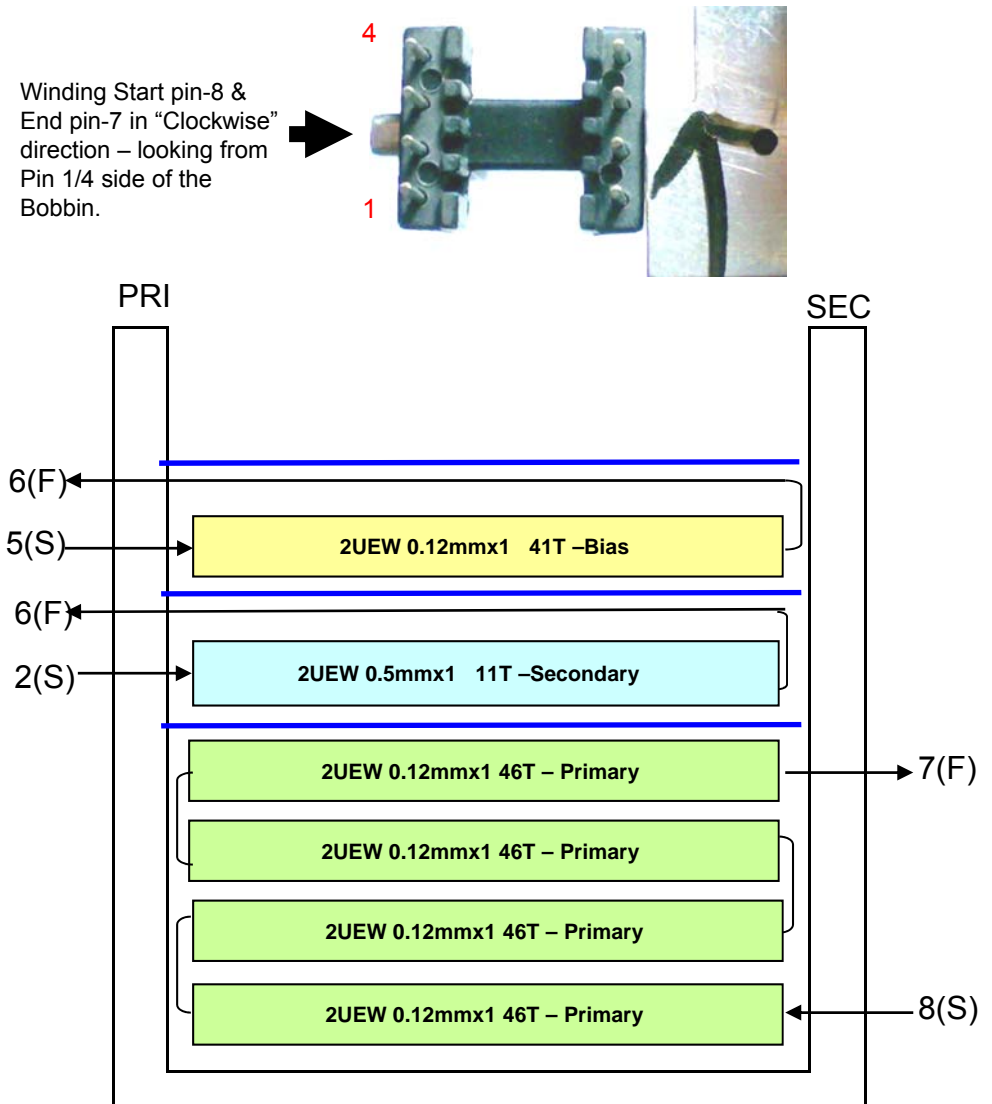
1. Primary Inductance (L_p) = 2.2mH @10KH
2. Primary Leakage Inductance (L_k) \leq 30uH@10KHz

MATERIALS:

1. Core : EE10 (Ferrite Material TDK PC40 or equivalent)
2. Bobbin : EE10
3. Magnet Wires : Type 2-UEW

FINISHED :

1. Varnish the complete assembly
2. Core should be connected to Pin6



5.BOM __Input 120Vac

Ref.	Description	Ref.	Description
U1	iW3602, Digital PWMController,Dimmable, SO-8	R13	24K Ω ±1%, SMD-0805
CX1	0.01uF,275V, X2	R14	2.4K Ω ±5%, SMD-0603
C2	6.8uF, 200V, E-CAP, 105°C ϕ 8*10	R15	10K Ω ±5%, SMD-0805
C3	47pF, 50V, X7R, SMD0603	R16	100 Ω ±5%, SMD-1206
C4	2.2nF,50V, X7R, SMD 0603	NTC	100K Ω ±5%, SMD-0805
C5	47uF, 25V, E-CAP, 5X11mm ϕ 5*10	BR1	MB8S, SMD
C6	100uF,6V, X7R, SMD	D1	RS1M, SMD
R1,R17	4.7K Ω ±5%, SMD-0805	D2	IN4148, SMD SOD-323
R2,R3	150K Ω ±5%, SMD-1206	D3	SCD34
R6	330 Ω +330 Ω 1/2W	Z1	Zener, 15V, SMD SOD-323
R7,R8	68K Ω ±5%, SMD-1206	F1	T1A250V
R9	47 Ω ±5%, SMD-0805	Q1.Q2	2N60, TO-251
R10	1K Ω ±1%, SMD-0805	Q3	DMZ6005, N-Depletion, 500V, SOT-23
R11	10 Ω /12 Ω ±1%, SMD-0805	L1,L3	4.7mH
R12	4.7 Ω ±1%, SMD-0603	T1	EE10, Transformer horizontal

6.Constant Current and Efficiency __No Dimmer

AC input 90-132Vac, Output 1 LEDs 900mA

# of LEDs	Vin	Pin	Vout	Iout	Ripple	efficiency	PF
	(V)	(W)	(V)	(A)	(m A)		
1LEDs	90	4.63	3.35	0.909		65.77%	0.70
	100	4.49	3.35	0.905		67.52%	0.67
	110	4.41	3.35	0.901		68.44%	0.66
	120	4.34	3.35	0.899		69.39%	0.64
	132	4.30	3.35	0.896		69.80%	0.62

7.Constant Current and Efficiency_ with dimmer

Leading edge dimmer

__LEVITON

__1 LEDs



Vin	DIM Level	Pin	LED Voltage	LED current	Pout	Eff
(V)		(W)	(V)	(mA)	(W)	(%)
90	Max.	5.50	3.28	911	2.98	54.2%
		2.51	3.10	457	1.42	56.4%
	Min.	0.77	2.73	46	0.13	16.3%
120	Max.	4.93	3.30	901	2.98	60.4%
		2.77	3.13	453	1.42	51.1%
	Min.	1.38	2.76	66	0.18	13.2%
132	Max.	4.92	3.29	901	2.96	60.2%
		2.62	3.09	414	1.28	48.9%
	Min.	1.37	2.77	65	0.18	13.1%

Leading edge dimmer

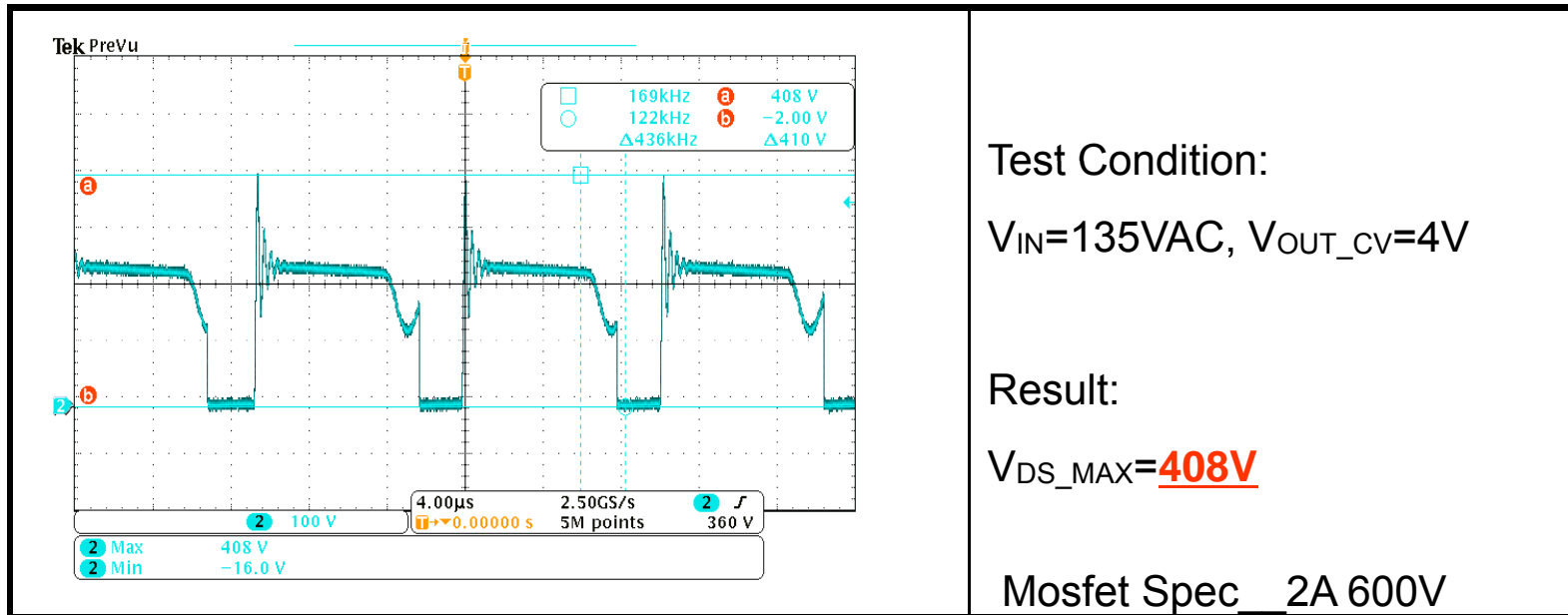
__LUTRON

__1 LEDs



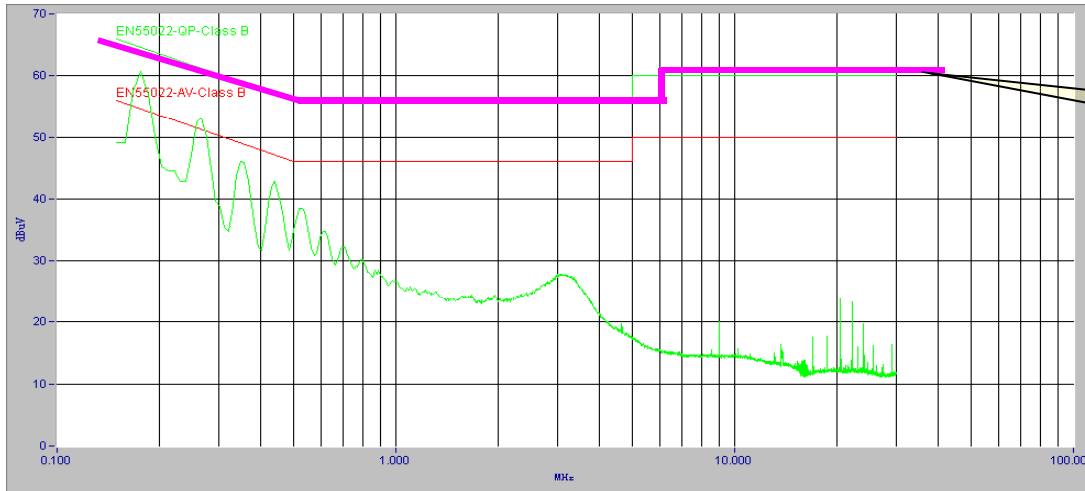
Vin	DIM Level	Pin	LED Voltage	LED current	Pout	Eff
(V)		(W)	(V)	(mA)	(W)	(%)
90	Max.	4.58	3.24	860	2.79	60.9%
		2.47	3.08	456	1.40	56.8%
	Min.	0.34	2.60	5	0.01	3.8%
120	Max.	4.96	3.26	902	2.94	59.3%
		2.51	3.06	415	1.27	50.6%
	Min.	0.45	2.58	3	0.01	1.7%
132	Max.	5.05	3.26	904	2.95	58.4%
		2.66	3.08	435	1.34	50.4%
	Min.	0.45	2.58	3	0.01	1.7%

8. V_{DS} waveform

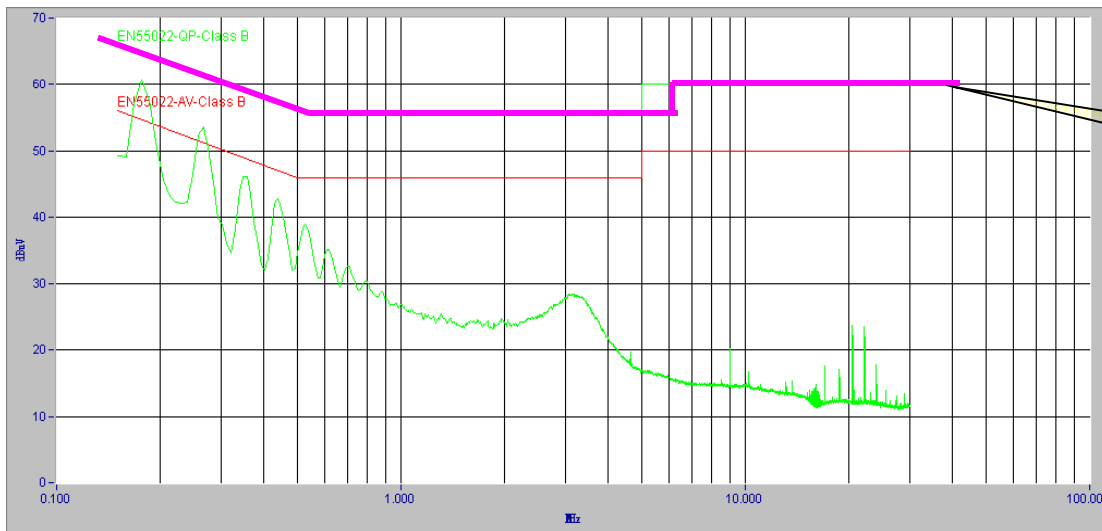


Symbol	Parameter	FTP02N60	FTA02N60	Unit
V_{DSS}	Drain-to-Source Voltage ^[1]	600		V
I_D	Continuous Drain Current	2.2	2.2*	A
$I_{D@100^\circ C}$	Continuous Drain Current	Figure 3		
I_{DM}	Pulsed Drain Current, $V_{GS}@10V$ ^[2]	Figure 6		
P_D	Power Dissipation	54	21	W
	Derating Factor above 25 °C	0.43	0.17	W/°C
V_{GS}	Gate-to-Source Voltage	±30		V
E_{AS}	Single Pulse Avalanche Energy $L=30mH$, $I_D=2.2A$	72		mJ
dv/dt	Peak Diode Recovery dv/dt ^[3]	4.5		V/ns
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300		°C
T_J and T_{STG}	Operating and Storage Temperature Range	-55 to 150		

9. Conducted EMI (Input 115Vac)

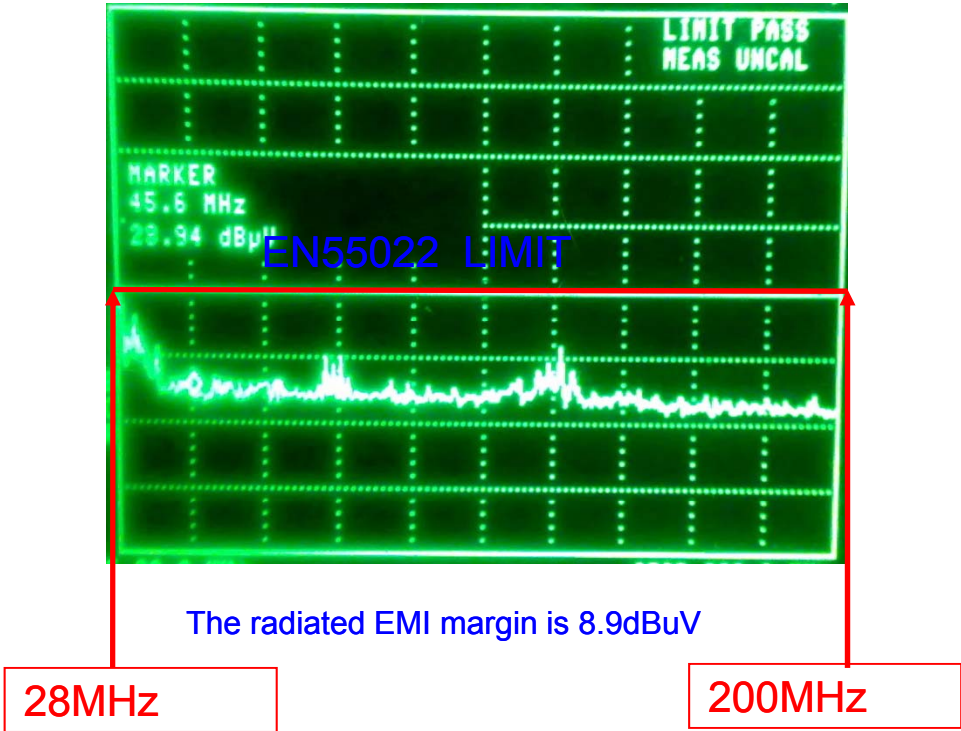


Peak scan L



Peak scan N

10. Radiated IEM (for reference)



Note: 1, Vin=115Vac

2, Output is 4V 900mA