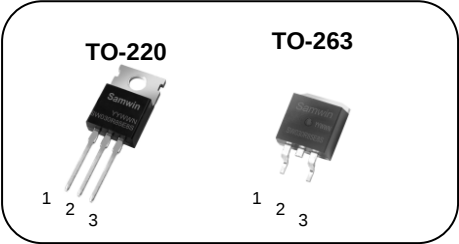


N-channel Enhanced mode TO-220/TO-263 MOSFET

Features

- High ruggedness
- Low $R_{DS(ON)}$ (Typ 3.1m Ω)@ $V_{GS}=10V$
- Low Gate Charge (Typ 86nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application:Synchronous Rectification, Li Battery Protect Board, Motor Drives



1. Gate 2.Drain 3.Source

BV_{DSS} : 85V
 I_D : 180A
 $R_{DS(ON)}$: 3.1m Ω

The circuit symbol for an N-channel MOSFET is shown. It consists of a circle with a horizontal line through the center. The left end of the horizontal line is labeled '1', the right end is labeled '2', and the bottom end is labeled '3'. The symbol is oriented with pin 1 on the left, pin 2 on the right, and pin 3 at the bottom.



General Description

This power MOSFET is produced with advanced technology of SAMWIN. This technology enable the power MOSFET to have better characteristics, including fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics.

Order Codes

Item	Sales Type	Marking	Package	Packaging
1	SW P 030R85E8S	SW030R85E8S	TO-220	TUBE
2	SW B 030R85E8S	SW030R85E8S	TO-263	REEL

Absolute maximum ratings

Symbol	Parameter	Value		Unit
		TO-220	TO-263	
V_{DSS}	Drain to source voltage	85		V
I_D	Continuous drain current (@ $T_C=25^{\circ}C$)	180*		A
	Continuous drain current (@ $T_C=100^{\circ}C$)	130*		A
I_{DM}	Drain current pulsed (note 1)	720		A
V_{GS}	Gate to source voltage	± 20		V
E_{AS}	Single pulsed avalanche energy (note 2)	552		mJ
E_{AR}	Repetitive avalanche energy (note 1)	50		mJ
dv/dt	Peak diode recovery dv/dt (note 3)	5		V/ns
P_D	Total power dissipation (@ $T_C=25^{\circ}C$)	223.2		W
	Derating factor above 25°C	1.8		W/°C
T_{STG}, T_J	Operating junction temperature & storage temperature	$-55 \sim +150$		°C
T_L	Maximum lead temperature for soldering purpose, 1/8 from case for 5 seconds.	300		°C

*, Drain current is limited by junction temperature.

Thermal characteristics

Symbol	Parameter	Value		Unit
		TO-220	TO-263	
R_{thjc}	Thermal resistance, Junction to case	0.56		°C/W
R_{thja}	Thermal resistance, Junction to ambient	56		°C/W

Electrical characteristic (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Off characteristics						
BV _{DSS}	Drain to source breakdown voltage	V _{GS} =0V, I _D =250uA	85			V
ΔBV _{DSS} / ΔT _J	Breakdown voltage temperature coefficient	I _D =250uA, referenced to 25°C		0.06		V/°C
I _{DSS}	Drain to source leakage current	V _{DS} =85V, V _{GS} =0V			1	uA
		V _{DS} =68V, T _J =125°C			50	uA
I _{GSS}	Gate to source leakage current, forward	V _{GS} =20V, V _{DS} =0V			100	nA
	Gate to source leakage current, reverse	V _{GS} =-20V, V _{DS} =0V			-100	nA
On characteristics						
V _{GS(TH)}	Gate threshold voltage	V _{DS} =V _{GS} , I _D =250uA	2		4	V
R _{DS(ON)}	Drain to source on state resistance	V _{GS} =10V, I _D =20A, T _J =25°C		3.1	3.7	mΩ
		V _{GS} =10V, I _D =20A, T _J =125°C		4.8		mΩ
G _{fs}	Forward transconductance	V _{DS} =5V, I _D =30A		61		S
Dynamic characteristics						
C _{iss}	Input capacitance	V _{GS} =0V, V _{DS} =43V, f=100kHz		5636		pF
C _{oss}	Output capacitance			928		
C _{rss}	Reverse transfer capacitance			47		
t _{d(on)}	Turn on delay time	V _{DS} =43V, I _D =30A, R _G =4.7Ω, V _{GS} =10V (note 4,5)		27		ns
t _r	Rising time			43		
t _{d(off)}	Turn off delay time			50		
t _f	Fall time			23		
Q _g	Total gate charge	V _{DS} =68V, V _{GS} =10V, I _D =30A , I _G =5mA (note 4,5)		86		nC
Q _{gs}	Gate-source charge			27		
Q _{gd}	Gate-drain charge			22		
R _g	Gate resistance	V _{DS} =0V, Scan F mode		1.0		Ω

Source to drain diode ratings characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I _S	Continuous source current	Integral reverse p-n Junction diode in the MOSFET			180	A
I _{SM}	Pulsed source current				720	A
V _{SD}	Diode forward voltage drop.	I _S =50A, V _{GS} =0V			1.4	V
t _{rr}	Reverse recovery time	I _S =30A, V _{GS} =0V, di _F /dt=100A/us		53		ns
Q _{rr}	Reverse recovery charge			74		nC

- ※. Notes
1.

Reapeitive rating : pulse width limited by junction temperature.
2.

L =0.5mH, I_{AS} =47A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
3.

I_{SD} ≤30A, di/dt = 100A/us, V_{DD} ≤ BV_{DSS}, Staring T_J =25°C
4.

Pulse Test : Pulse Width ≤ 300us, duty cycle ≤ 2%.
5.

Essentially independent of operating temperature.

Fig. 1. On-state characteristics

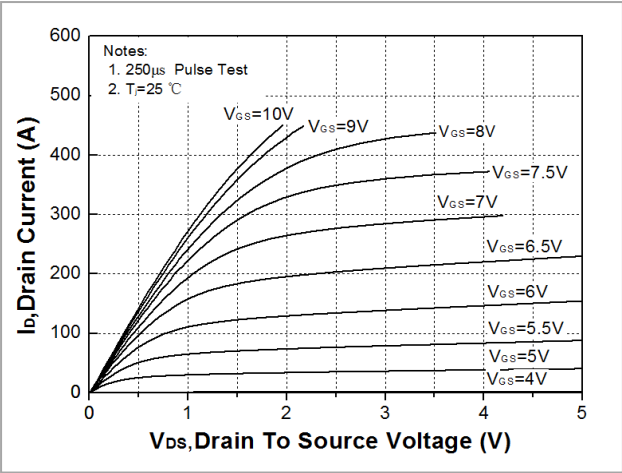


Fig. 2. Transfer Characteristics

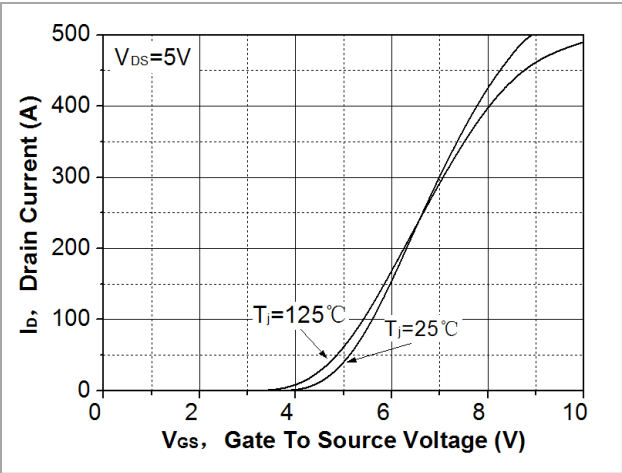


Fig. 3. On-resistance variation vs. drain current and gate voltage

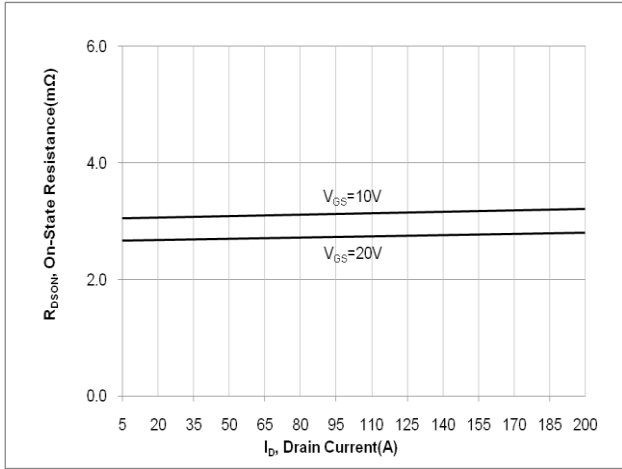


Fig. 4. On-state current vs. diode forward voltage

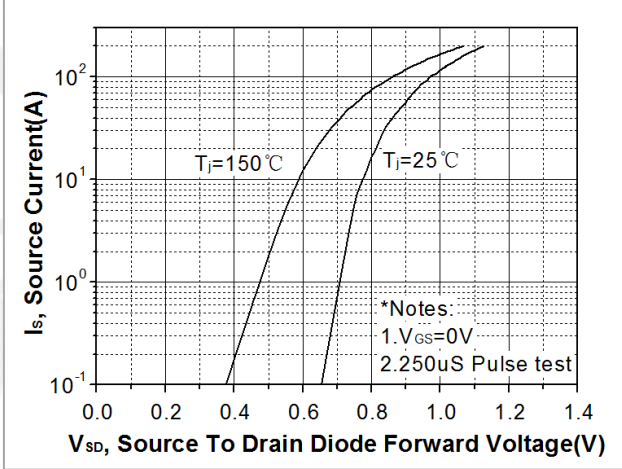


Fig 5. Breakdown voltage variation vs. junction temperature

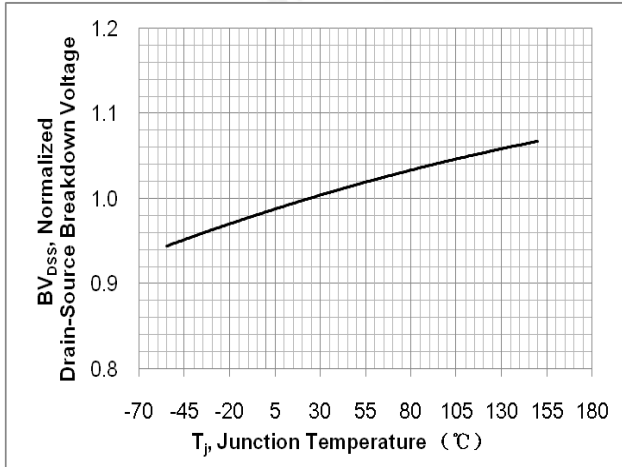


Fig. 6. On-resistance variation vs. junction temperature

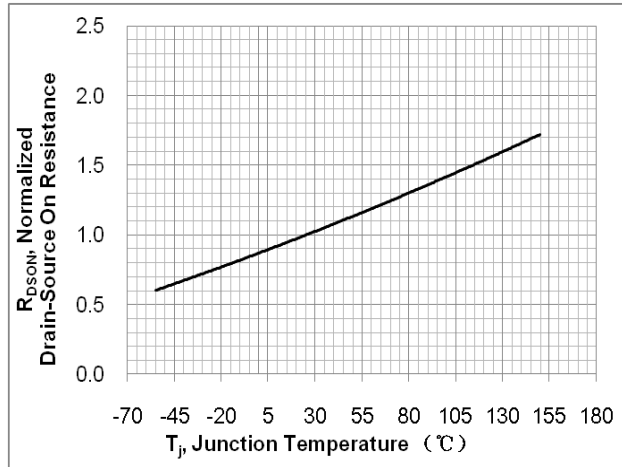


Fig. 7. Gate charge characteristics

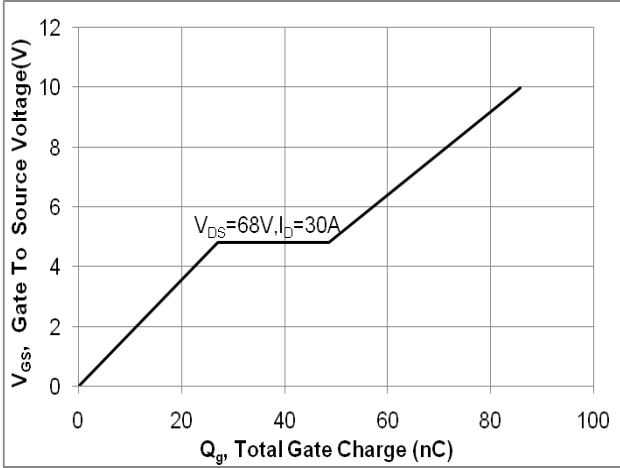


Fig. 8. Capacitance Characteristics

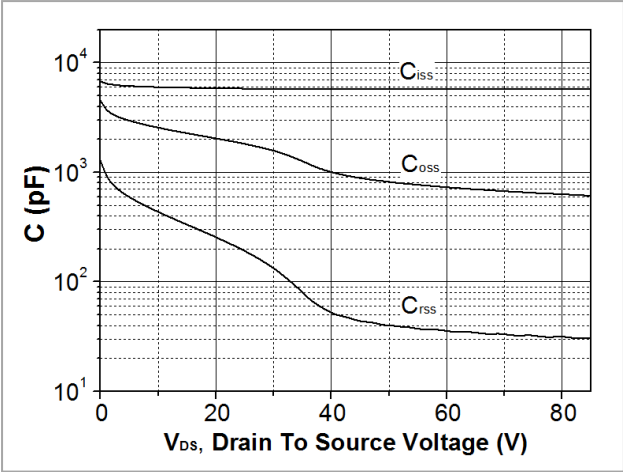


Fig. 9. Maximum safe operating area (TO-220&TO-263)

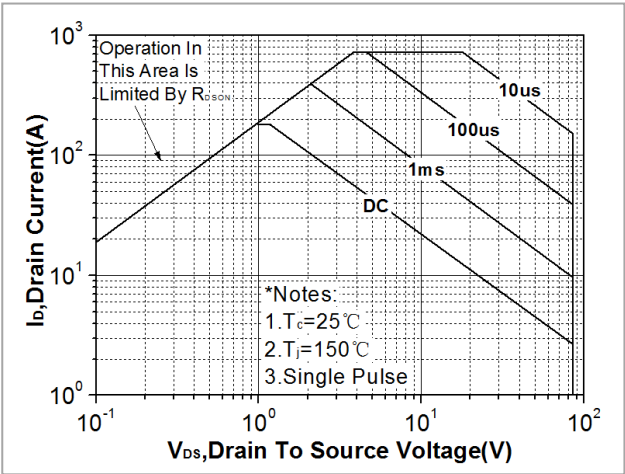


Fig. 10. Maximum drain current vs. case temperature (TO-220&TO-263)

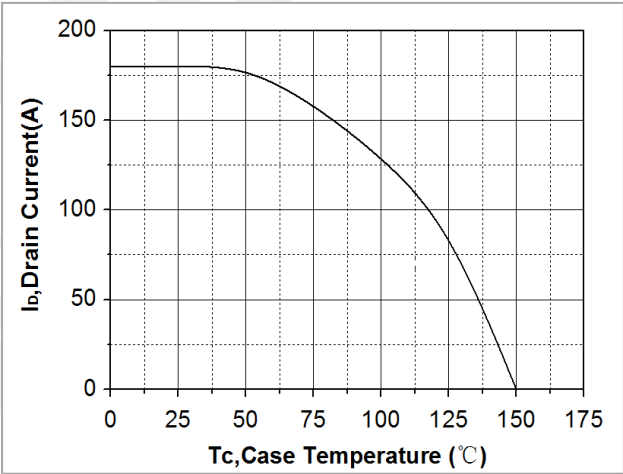


Fig. 11. Transient thermal response curve (TO-220&TO-263)

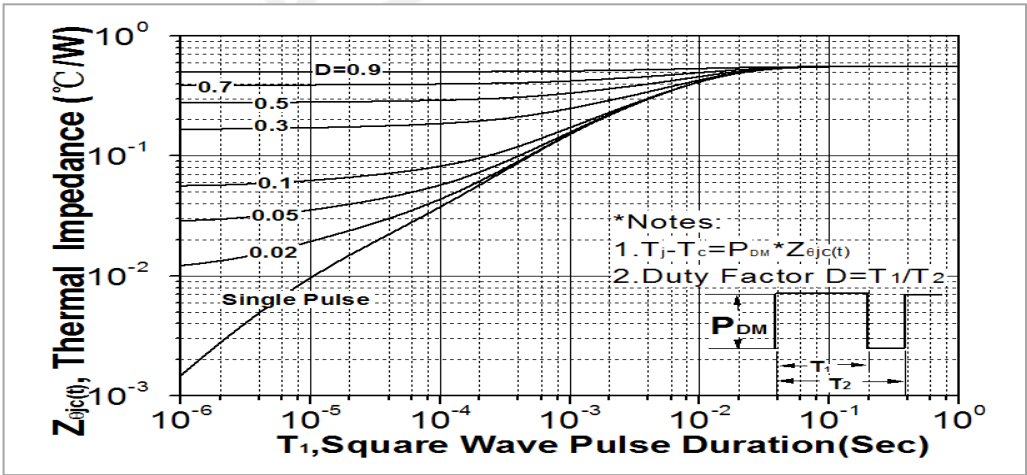


Fig. 12. Gate charge test circuit & waveform

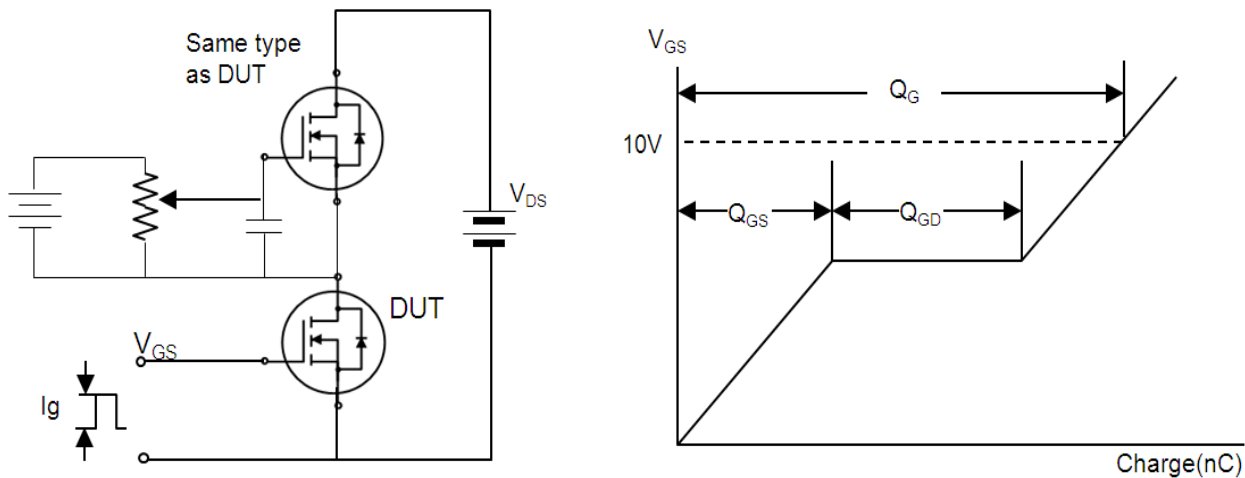


Fig. 13. Switching time test circuit & waveform

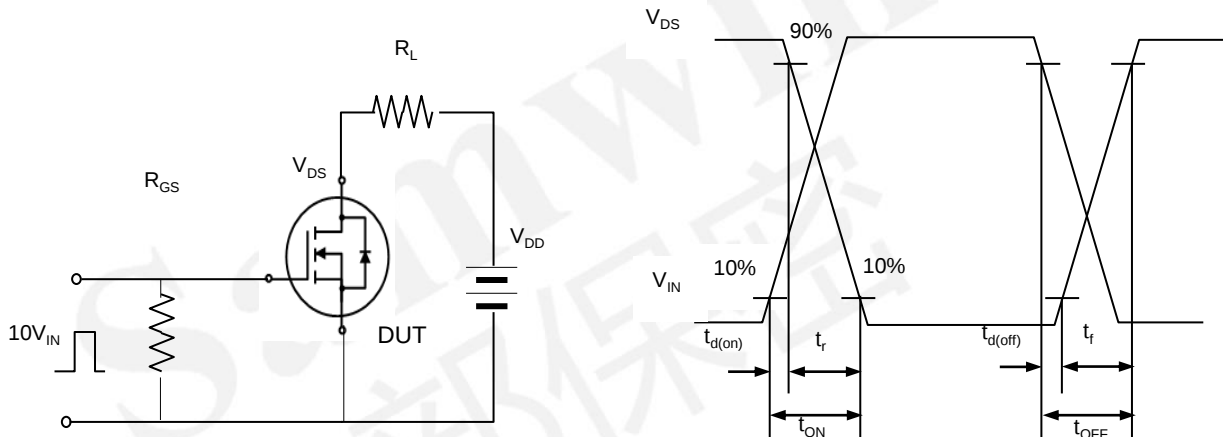


Fig. 14. Unclamped Inductive switching test circuit & waveform

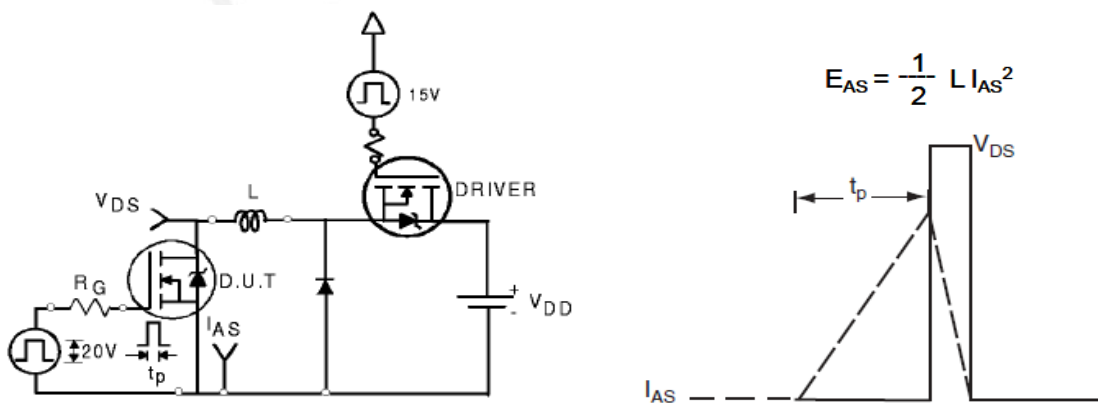
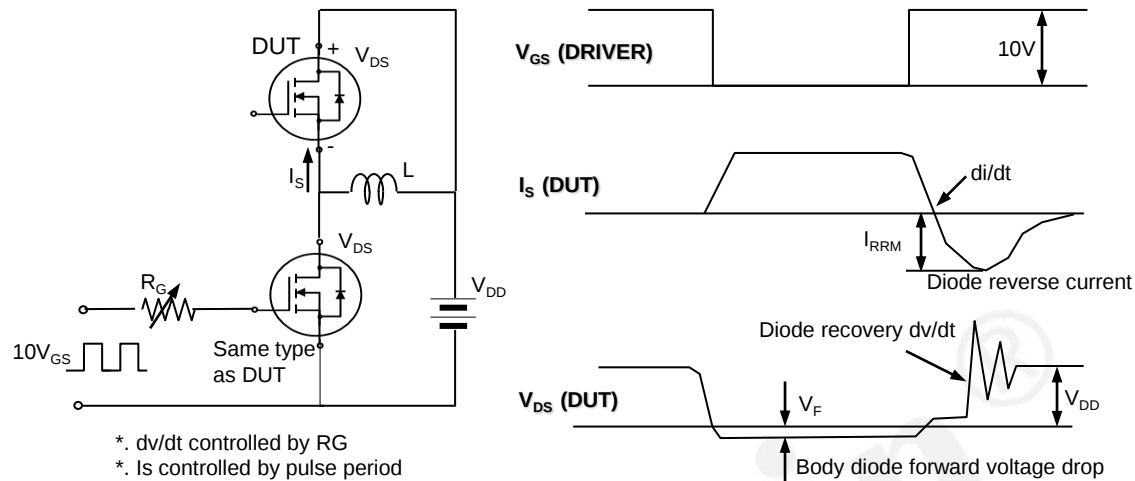


Fig. 15. Peak diode recovery dv/dt test circuit & waveform



DISCLAIMER

- * All the data & curve in this document was tested in SEMIPOWER TESTING & APPLICATION CENTER.
- * This product has passed the PCT,TC,HTRB,HTGB,HAST,PC and Solderdunk reliability testing.