

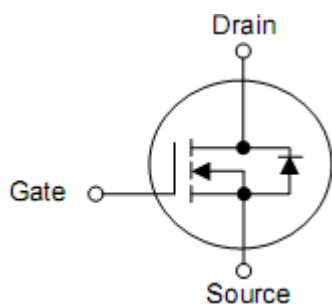
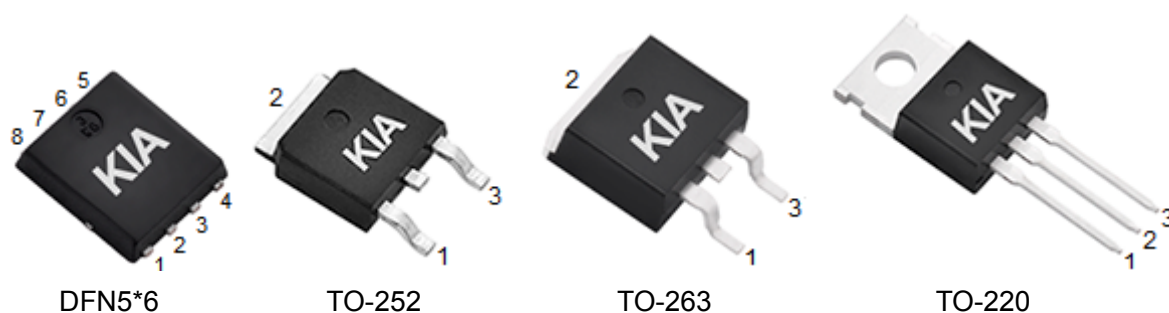
1. Features

- $R_{DS(ON)}=2.0m\Omega(\text{typ.})@V_{GS}=10V$ (DFN5*6)
- $R_{DS(ON)}=2.5m\Omega(\text{typ.})@V_{GS}=10V$ (TO-252,TO-263,TO-220)
- Very Low On-resistance $R_{DS(ON)}$
- Low C_{rss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

2. Applications

- PWM Application
- Load Switch
- Power Management

3. Symbol



Pin		Function
DFN5*6	TO-252,TO-263, TO-220	
4	1	Gate
5,6,7,8	2	Drain
1,2,3	3	Source

4. Ordering Information

Part Number	Package	Brand
KNY2904A	DFN5*6	KIA
KND2904A	TO-252	KIA
KNB2904A	TO-263	KIA
KNP2904A	TO-220	KIA

5. Absolute maximum ratings

$T_C=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Rating			Units
		DFN5*6	TO-252	TO-263 TO-220	
Drain-source voltage ¹⁾	V_{DSS}	40			V
Gate-to-Source Voltage	V_{GSS}	± 20			V
Continuous drain current ^{2),3)}	$T_C=25^{\circ}\text{C}$ I_D	130			A
	$T_C=100^{\circ}\text{C}$ I_D	84			A
Pulsed Drain Current at $V_{GS}=10\text{V}$ ¹⁾	I_{DM}	400			A
Single pulse avalanche energy ²⁾	E_{AS}	250			mJ
Power dissipation ($T_C=25^{\circ}\text{C}$)	P_D	54	130	328	W
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300			$^{\circ}\text{C}$
Operating junction and storage temperature range	T_J, T_{STG}	-55 to 150			$^{\circ}\text{C}$

Caution: Stresses greater than those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

6. Thermal characteristics

Parameter	Symbol	Rating			Unit
		DFN5*6	TO-252	TO-263/TO-220	
Thermal resistance junction-case	$R_{\theta JC}$	2.3	0.96	0.38	$^{\circ}\text{C/W}$

7. Electrical characteristics

(T_C=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Units
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA		40	-	-	V
Drain-source leakage current	I _{DSS}	V _{DS} =40V, V _{GS} =0V		-	-	1	uA
Gate-source forward leakage	I _{GSS}	V _{GS} =±20V, V _{DS} =0V		-	-	±100	nA
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250uA		1.0	1.5	2.3	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A	DFN5*6	-	2.0	2.7	mΩ
			Others	-	2.5	3.2	mΩ
		V _{GS} =4.5V, I _D =15A	DFN5*6	-	2.6	3.5	mΩ
			Others	-	3.1	4.2	mΩ
Gate Series Resistance	R _G	f=1MHz		-	1.3	-	Ω
Input capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V f=1MHz		-	6260	-	pF
Reverse transfer capacitance	C _{oss}			-	580	-	pF
Output capacitance	C _{rss}			-	570	-	pF
Turn-on delay time	t _{d(on)}	V _{GS} =10V, V _{DS} =20V, R _L =3Ω, I _D =10A T _J =25°C ³⁾		-	18	-	ns
Rise time	t _r			-	20	-	ns
Turn-off delay time	t _{d(off)}			-	50	-	ns
Fall time	t _f			-	16	-	ns
Total gate charge	Q _g	V _{DS} =15V, I _D =20A V _{GS} =10V ³⁾		-	135	-	nC
Gate-source charge	Q _{gs}			-	30	-	nC
Gate-drain charge	Q _{gd}			-	19	-	nC
Maximum Continuous Drain-Source Diode Forward Current	I _S	—		-	-	130	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}	—		-	-	400	A
Drain to Source Diode Forward Voltage	V _{SD}	I _{SD} =20A, V _{GS} =0V, T _J =25°C		-	-	1.2	V

Note:

- 1). Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- 2). EAS condition: T_J=25°C, V_{DD}=20V, V_G=10V, R_G=25Ω, L=0.5mH.
- 3). Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

8. Typical operating characteristics

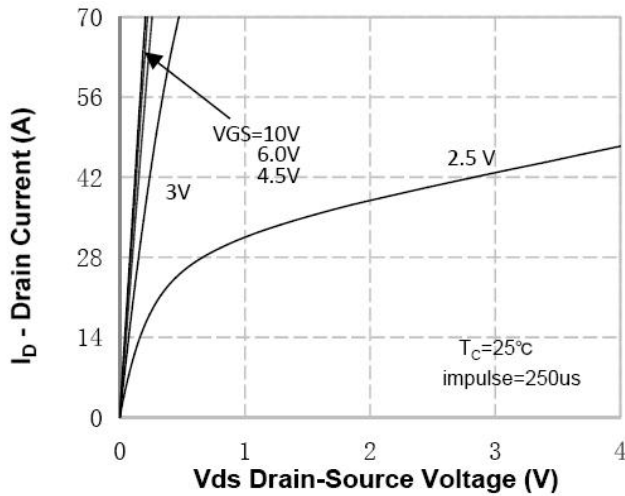


Figure 1. On-Region Characteristics

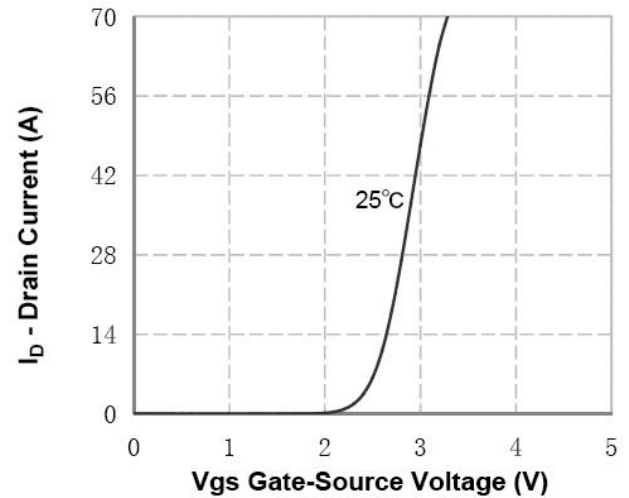


Figure 2. Transfer Characteristics

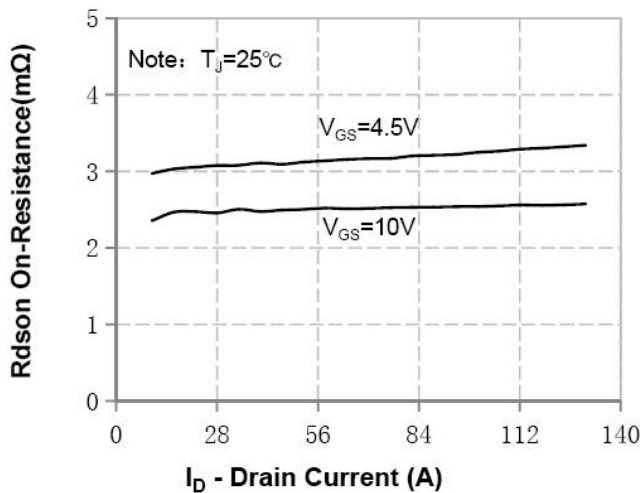


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

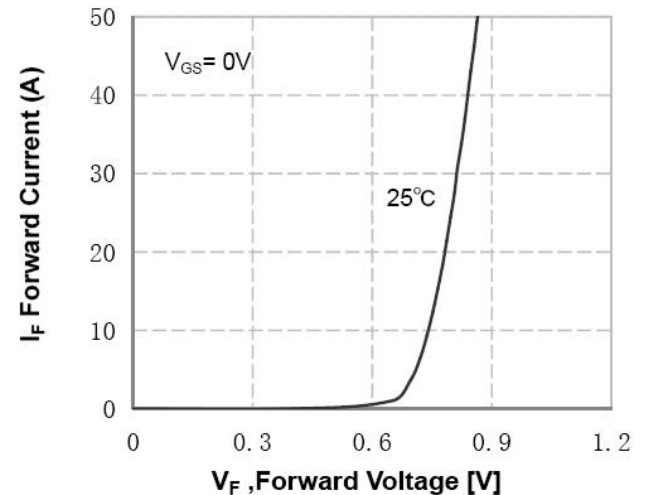


Figure 4. Body Diode Forward Voltage Variation with Source Current

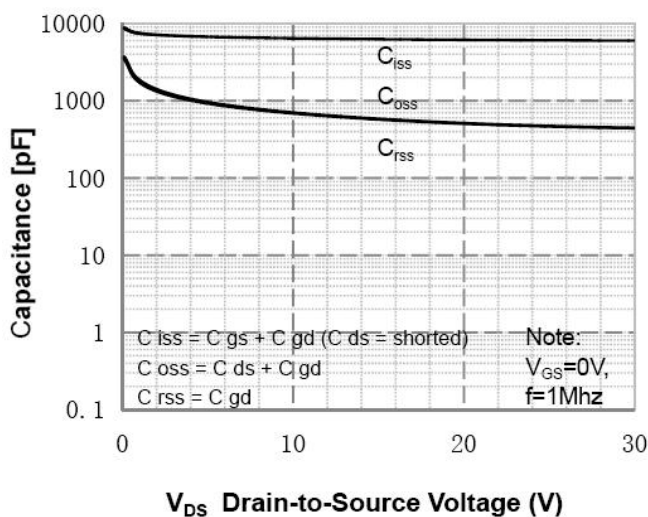


Figure 5. Capacitance Characteristics

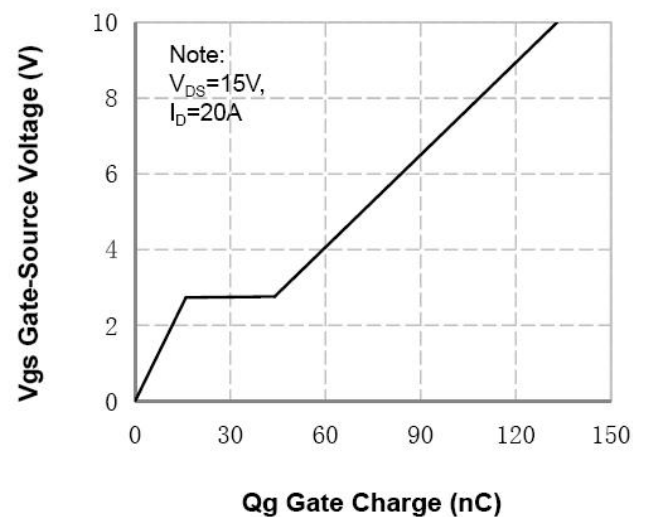


Figure 6. Gate Charge Characteristics

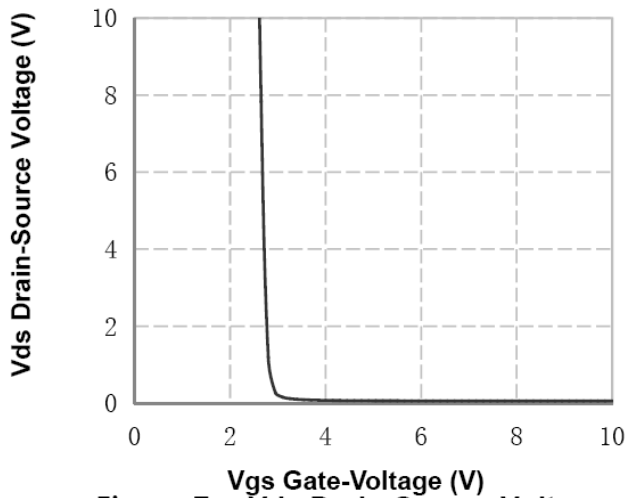


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

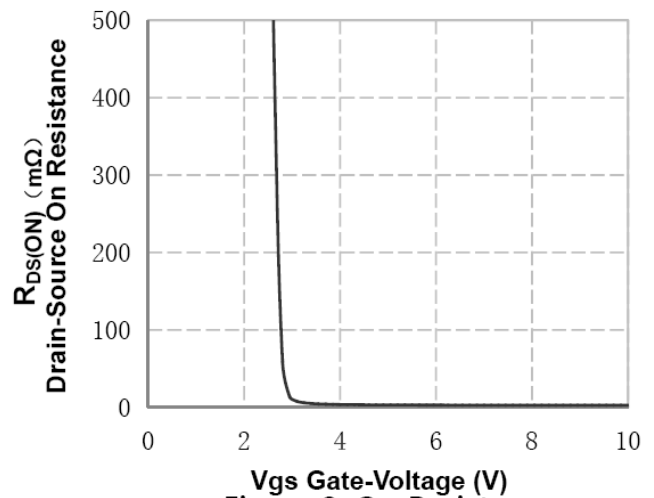


Figure 8. On-Resistance vs Gate Voltage

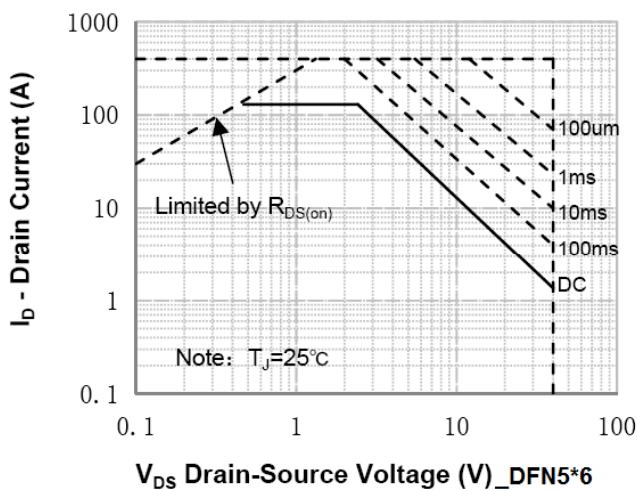


Figure 9.1 Maximum Safe Operating Area

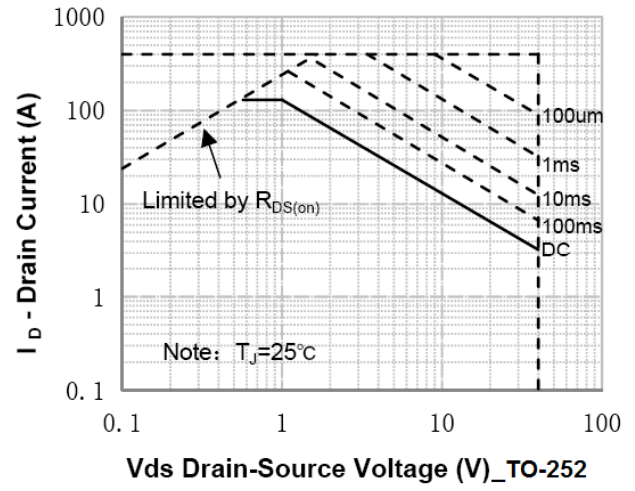


Figure 9.2 Maximum Safe Operating Area

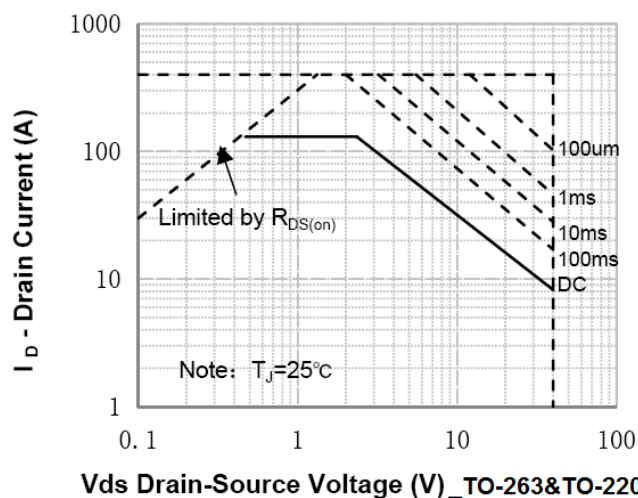


Figure 9.3 Maximum Safe Operating Area

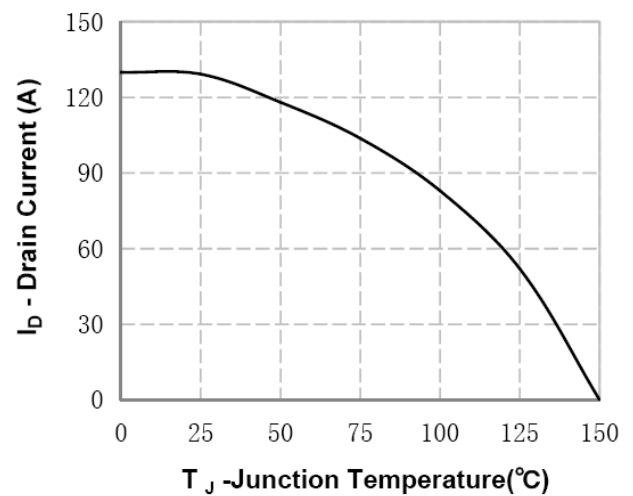


Figure 10. Maximum Continuous Drain Current vs Temperature

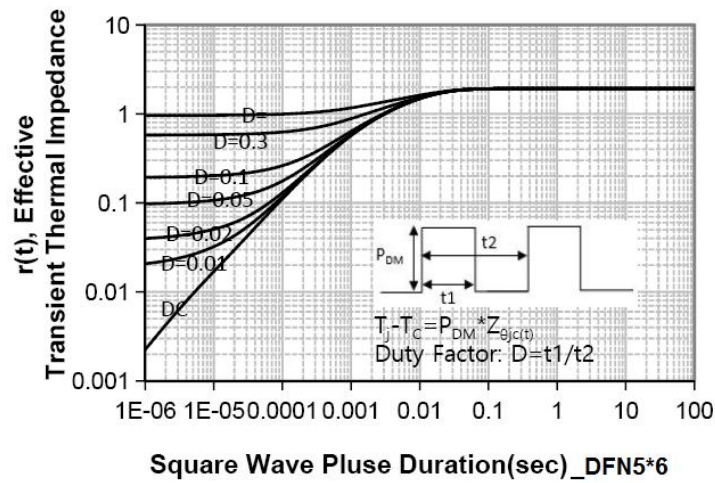


Figure 11. Transient Thermal Response Curve

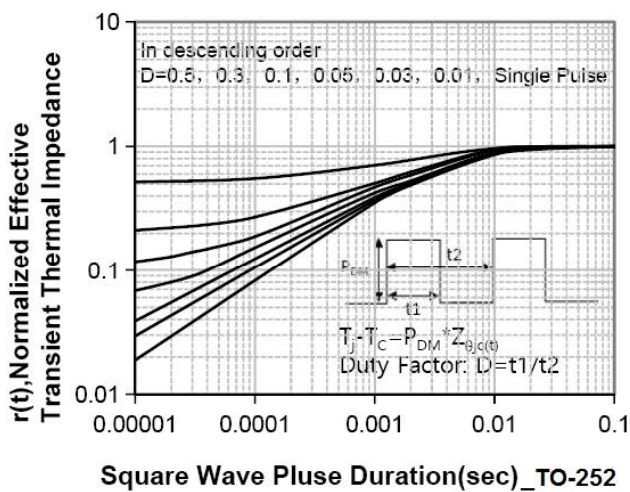


Figure 12. Transient Thermal Response Curve

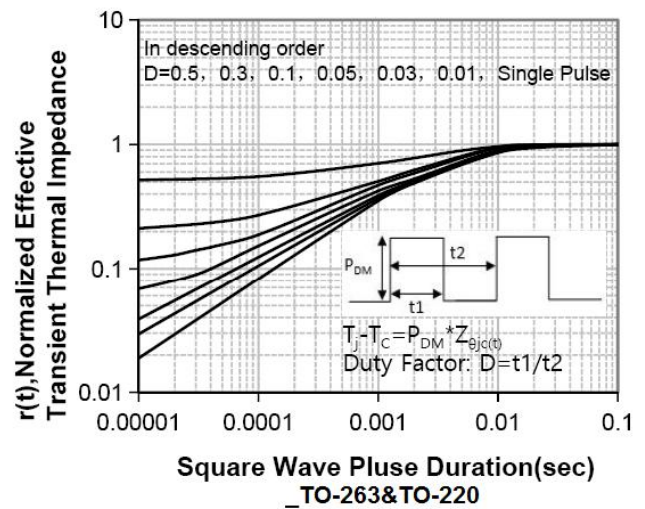
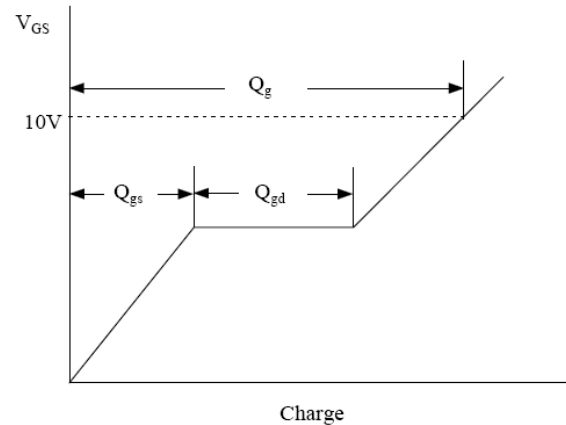
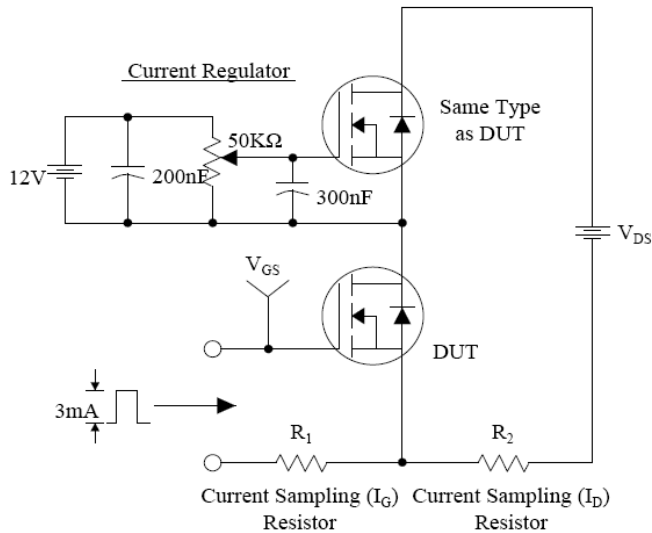


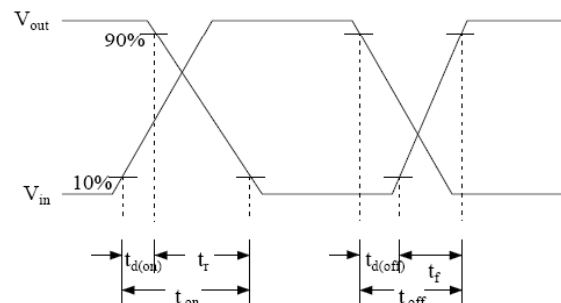
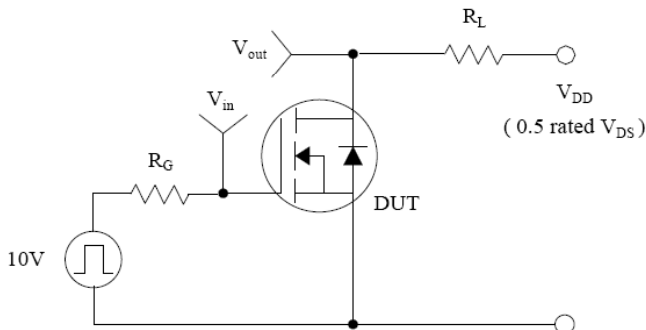
Figure 13. Transient Thermal Response Curve

9. Test Circuits and Waveforms

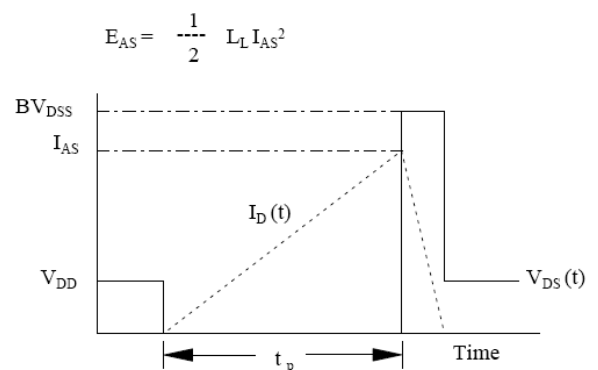
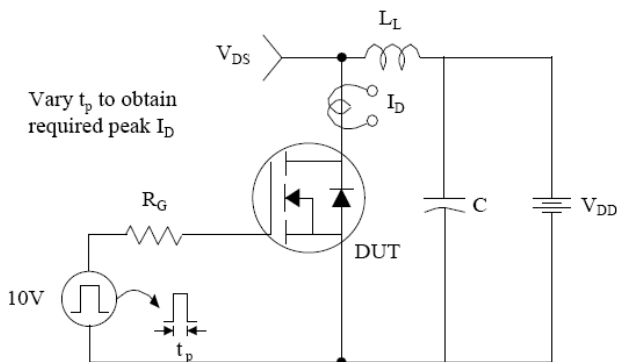
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

