

1. Description

- Uses advanced SGT technology
- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density
- Easy paralleling

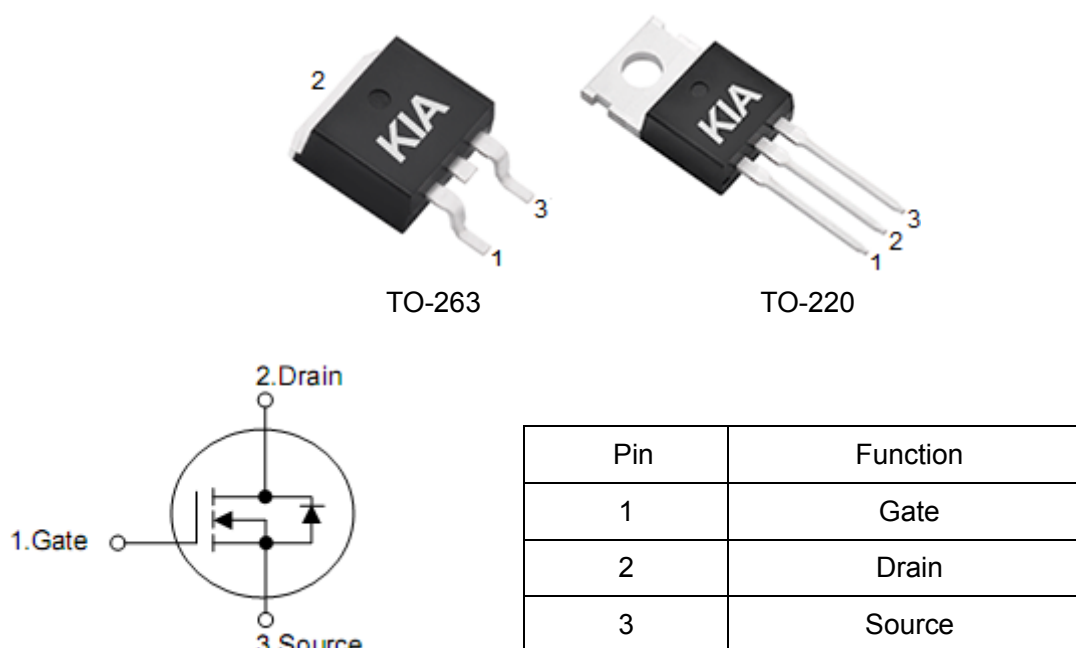
2. Features

- $R_{DS(on)} = 2.0m\Omega(\text{typ.}) @ V_{GS} = 10V$
- Extremely low on-resistance $R_{DS(on)}$
- Excellent Low Ciss

3. Application

- Synchronous Rectification for AC/DC Quick Charger
- Battery management
- Uninterruptible Power Supply

4. Pin configuration



5. Ordering Information

Part Number	Package	Brand
KCB2904A	TO-263	KIA
KCP2904A	TO-220	KIA

6. Absolute maximum ratings

Parameter		Symbol	Value	Unit
Drain-source voltage		V_{DS}	45	V
Continuous drain current	$T_C=25^{\circ}\text{C}$ (Silicon limit)	I_D	130	A
	$T_C=25^{\circ}\text{C}$ (Package limit)	I_D	300	A
	$T_C=100^{\circ}\text{C}$ (Silicon limit)	I_D	137	A
	$T_a=25^{\circ}\text{C}$	I_D	24	A
Pulsed drain current ($T_C=25^{\circ}\text{C}$, $t_p=100\mu\text{s}$)		I_D pulse	865	A
Avalanche energy, single pulse ($L=0.5\text{Mh}$, $V_{ds}=32\text{V}$)		E_{AS}	200	mJ
Gate-Source voltage		V_{GS}	± 20	V
Power dissipation	$T_C=25^{\circ}\text{C}$	P_{tot}	125	W
	$T_a=25^{\circ}\text{C}$	P_{tot}	1.5	W
Operating junction and storage temperature		T_j, T_{stg}	-55 to +150	$^{\circ}\text{C}$
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)		T_{sold}	260	$^{\circ}\text{C}$

7. Thermal Data

Parameter	Symbol	Ratings	Units
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.0	$^{\circ}\text{C/W}$
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	81	$^{\circ}\text{C/W}$

8. Electrical characteristics

(T_J=25°C, unless otherwise noted)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	45	-	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	2	-	4	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =45V, V _{GS} =0V, T _J =25°C	-	0.05	1	uA
		V _{DS} =45V, V _{GS} =0V, T _J =150°C	-	-	100	uA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	±10	±100	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A	-	2.0	2.6	mΩ
Transconductance	g _{FS}	V _{DS} =5V, I _D =20A	-	43	-	S
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =20V, f=1MHz	-	4195	-	pF
Output Capacitance	C _{oss}		-	1380	-	pF
Reverse Transfer Capacitance	C _{rss}		-	110	-	pF
Gate Total Charge	Q _G	V _{DS} =20V, I _D =50A, V _{GS} =10V	-	60	-	nC
Gate-Source charge	Q _{gs}		-	21	-	
Gate-Drain charge	Q _{gd}		-	8	-	
Turn-on delay time	t _{d(on)}	V _{GS} =10V, V _{DD} =7V, R _G =2.2Ω, I _D =30A	-	16	-	ns
Rise time	t _r		-	18.3	-	
Turn-off delay time	t _{d(off)}		-	44	-	
Fall time	t _f		-	11.5	-	
Gate resistance	R _G	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	2.5	-	Ω
Body Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _{SD} =20A	-	0.78	1.2	V
Body Diode Continuous Forward Current	I _S	T _C =25°C	-	-	216	A
Body Diode Pulsed Current	I _S pulse	T _C =25°C	-	-	865	A
Body Diode Reverse Recovery Time	t _{rr}	I _F =35A, V _R =30V, dI/dt=100A/μs	-	98	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	199	-	nC

9. Typical Electrical Characteristics

Fig 1: Output Characteristics

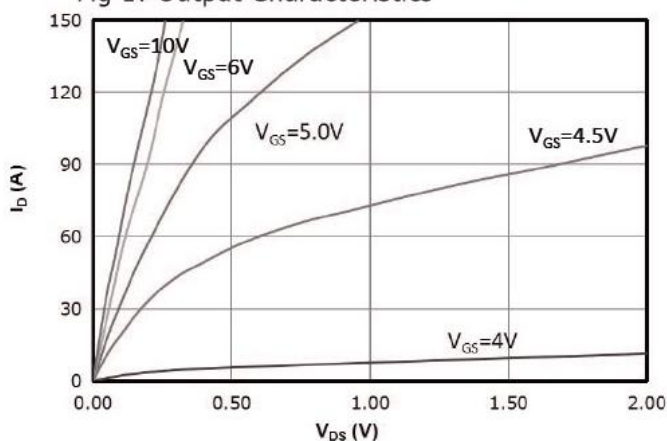


Fig 2: Transfer Characteristics

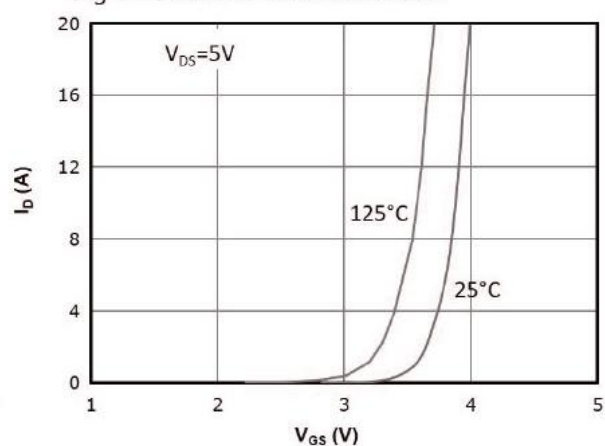


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

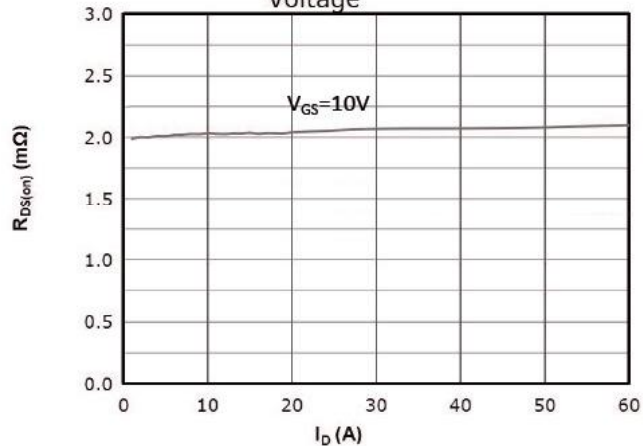


Fig 4: $R_{DS(on)}$ vs Gate Voltage

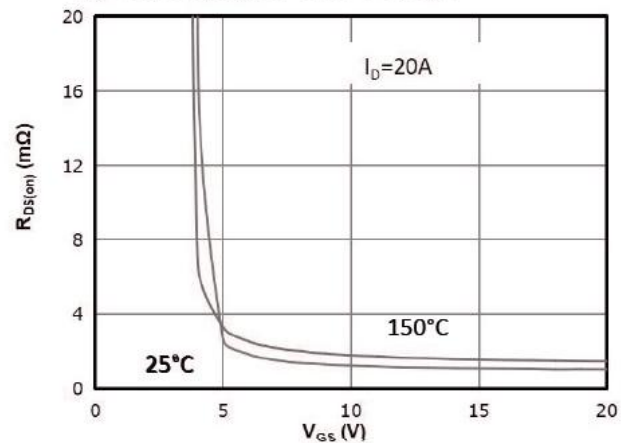


Fig 5: $R_{DS(on)}$ vs. Temperature

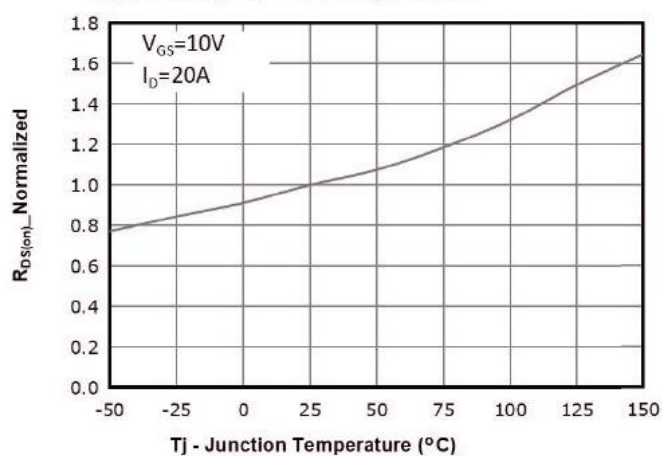


Fig 6: $V_{GS(th)}$ vs. Temperature

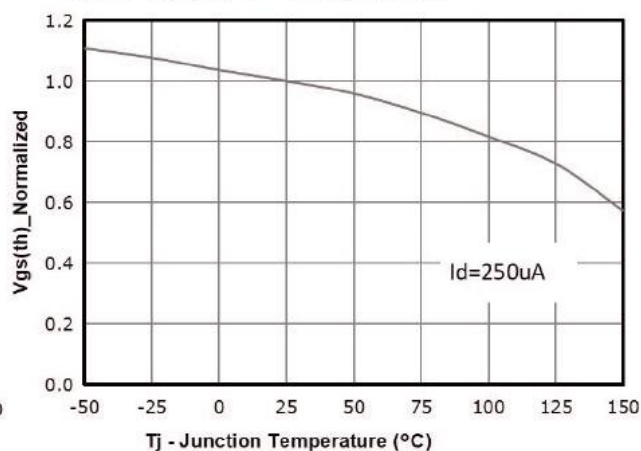


Fig 7: BVdss vs. Temperature

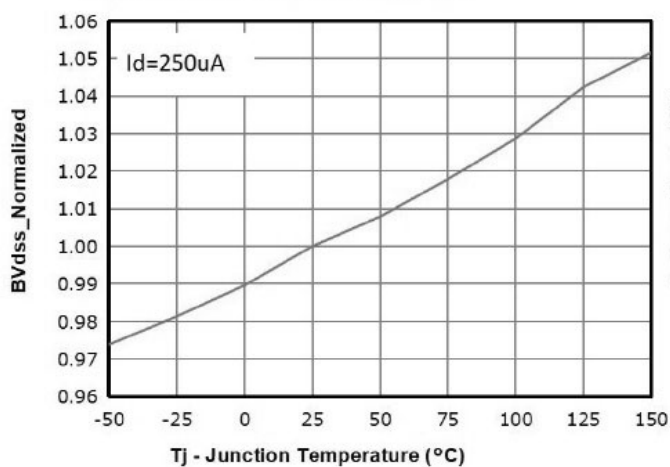


Fig 8: Capacitance Characteristics

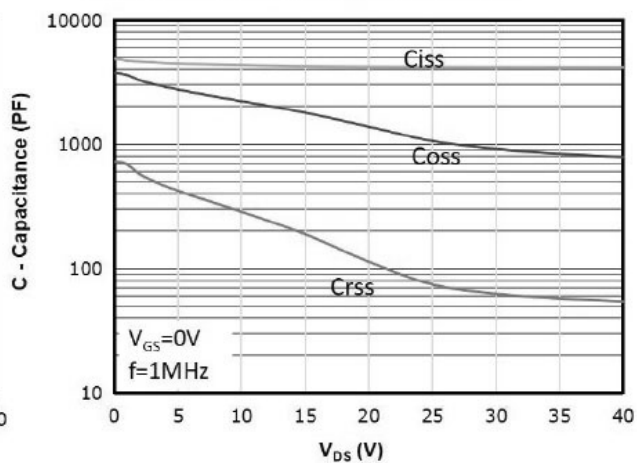


Fig 9: Gate Charge Characteristics

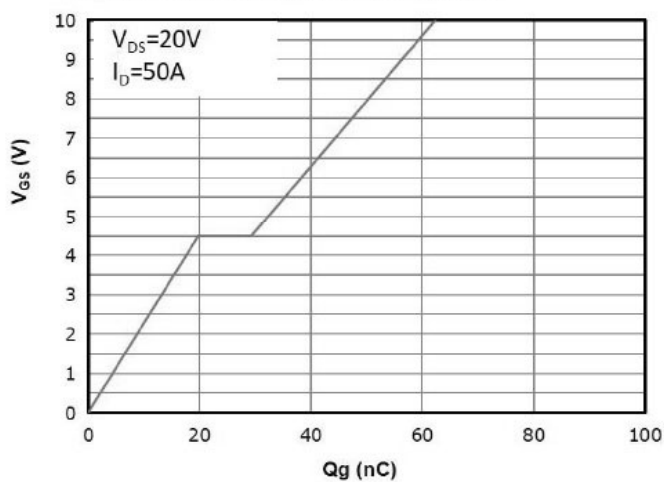


Fig 10: Body-diode Forward Characteristics

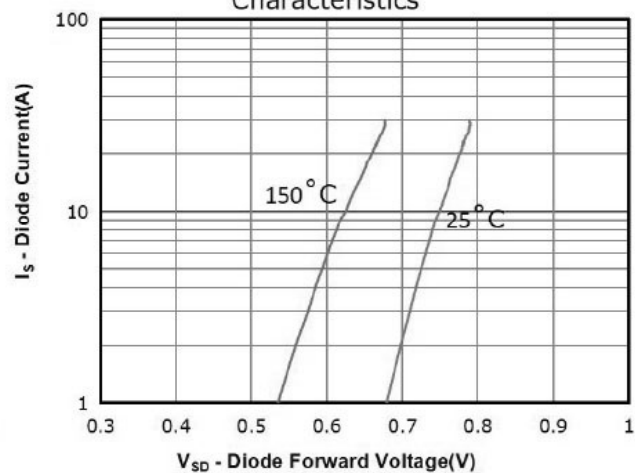


Fig 11: Power Dissipation

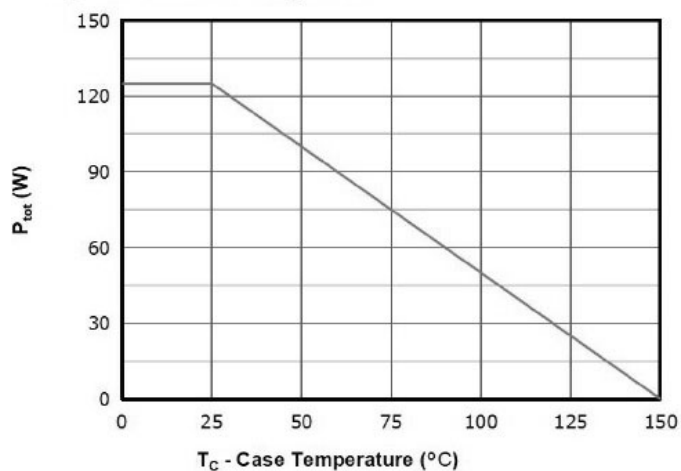


Fig 12: Drain Current Derating

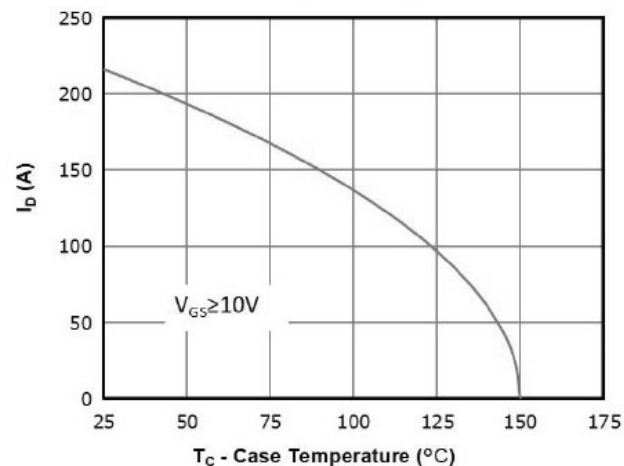


Fig 13: Safe Operating Area

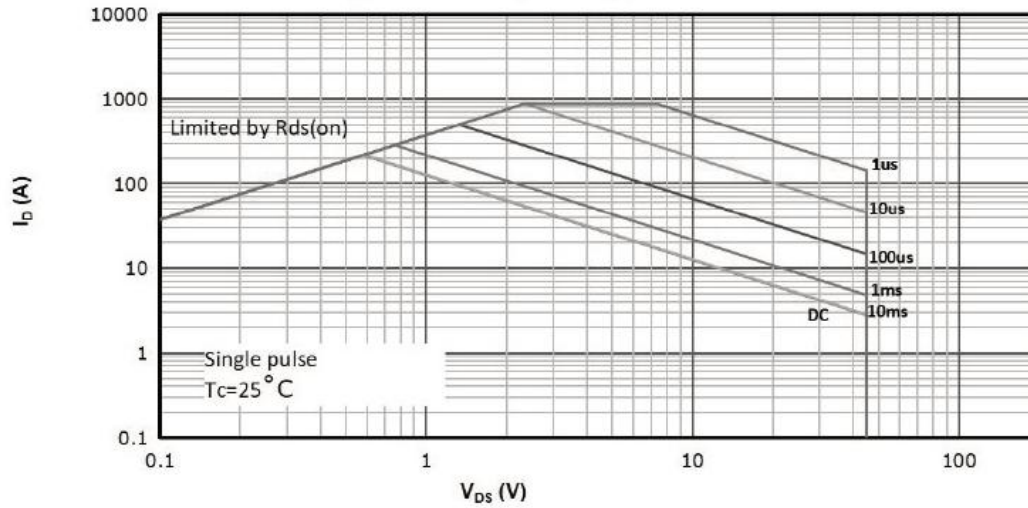
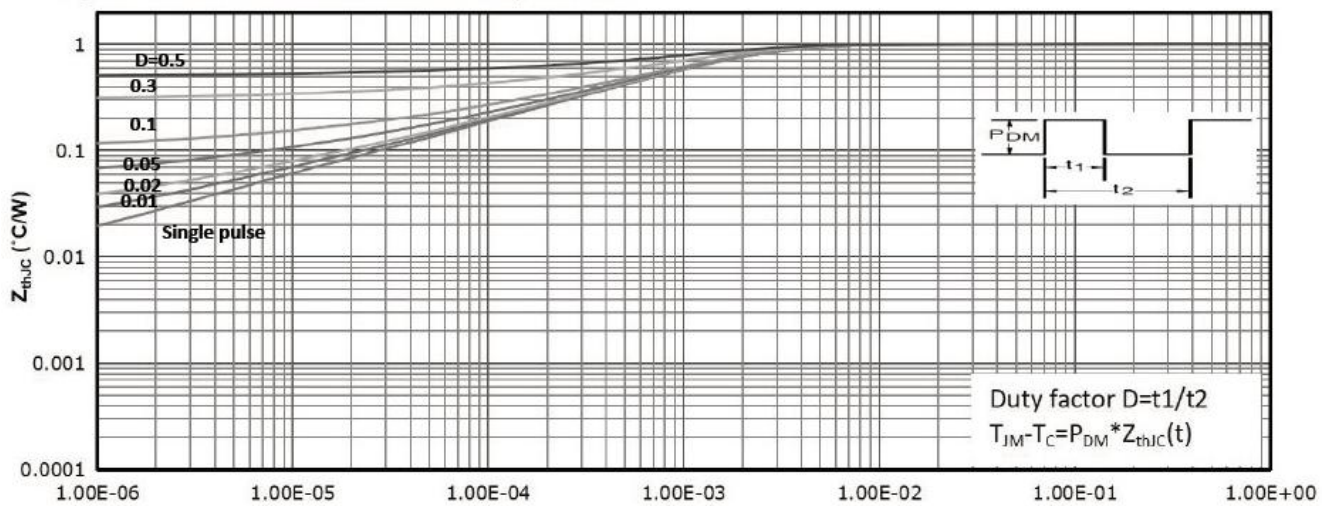
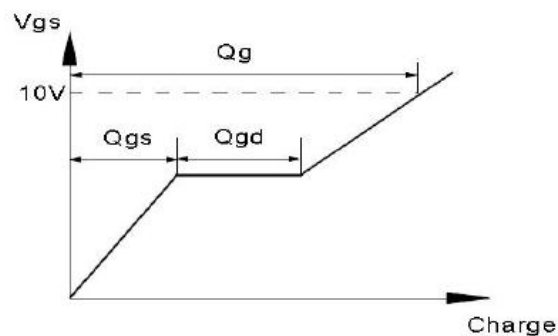
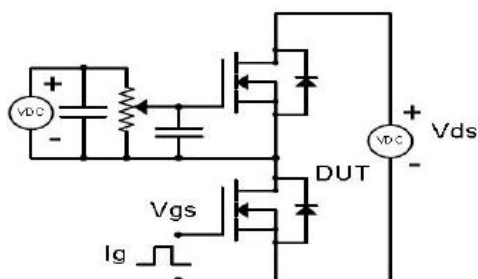


Fig 14: Max. Transient Thermal Impedance

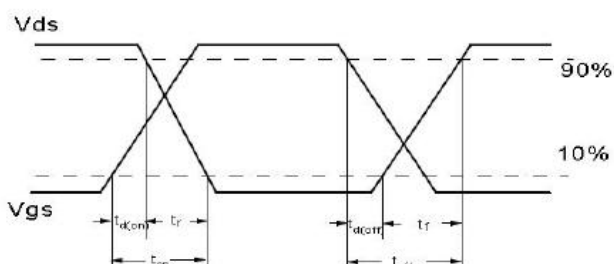
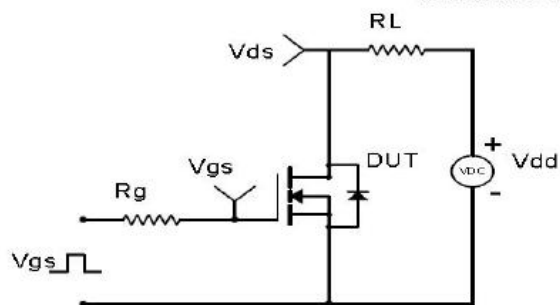


10. Test Circuits and Waveforms

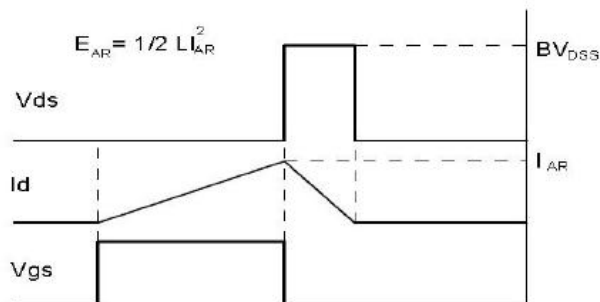
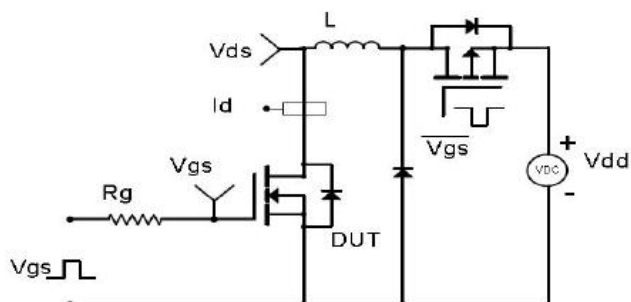
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

