

### Features

- Low drain-source on-resistance:  $R_{DS(ON)}=0.74\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode:  $V_{th} = 2.0$  to  $4.0V$
- 100% avalanche tested
- Built-in ESD Diode
- RoHS compliant

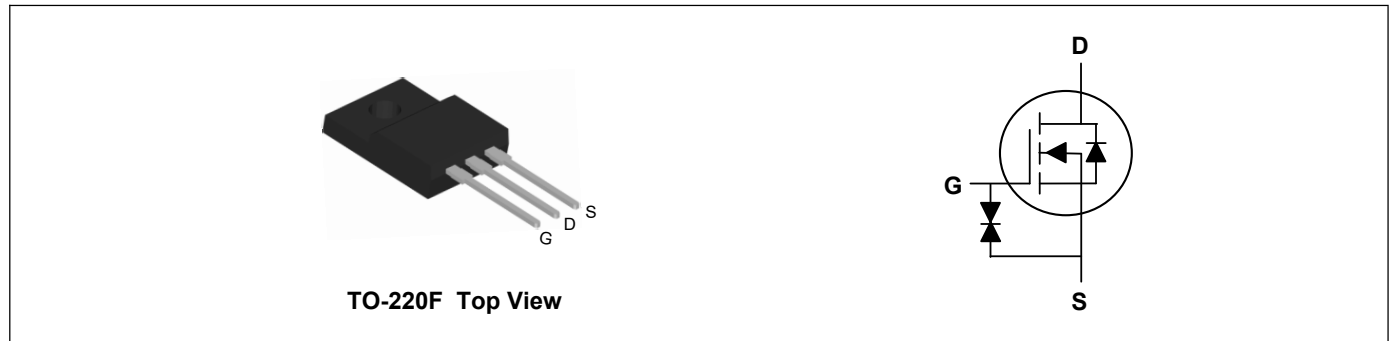
### Key Performance Parameters



Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	800	V
$R_{DS(ON),max}$	850	m $\Omega$
$I_D$	6.6	A
$Q_{g,typ}$	13.7	nC
$I_{DM}$	19.8	A

### Applications

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	800	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current <sup>1</sup>	$I_D @ T_C=25^\circ\text{C}$	6.6	A
Continuous Drain Current <sup>1</sup>	$I_D @ T_C=100^\circ\text{C}$	4.2	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	19.8	A
Single Pulse Avalanche Energy <sup>4</sup>	EAS	200	mJ
Avalanche Current	$I_{AS}$	6.3	A
MOSFET dv/dt ruggedness, $V_{DS} = 0 \dots 400V$	dv/dt	50	V/ns
Reverse diode dv/dt <sup>3</sup> $V_{DS}=0 \dots 400V, I_{DS} \leq I_D$		15	
Total Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	27	W
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient (Max)	$R_{\theta JA}$	80	$^\circ\text{C/W}$
Thermal Resistance Junction-Case (Max)	$R_{\theta JC}$	4.57	$^\circ\text{C/W}$

**Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=1mA$	800	---	---	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1.6A$	---	740	850	$m\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=220\mu A$	2.0	---	4.0	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=800V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
		$V_{DS}=800V, V_{GS}=0V, T_J=150^{\circ}\text{C}$	---	---	100	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	$\pm 1$	$\mu A$
Total Gate Charge	$Q_g$	$V_{DD}=640V, V_{GS}=10V, I_D=2.8A$	---	13.7	---	nC
Gate-Source Charge	$Q_{gs}$		---	2.9	---	
Gate-Drain Charge	$Q_{gd}$		---	4.2	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=400V, R_G=25\Omega, I_D=2.8A$	---	23	---	ns
Rise Time	$T_r$		---	18	---	
Turn-Off Delay Time	$T_{d(off)}$		---	74	---	
Fall Time	$T_f$		---	17	---	
Input Capacitance	$C_{iss}$	$V_{DS}=500V, V_{GS}=0V, f=1MHz$	---	635	---	$\mu F$
Output Capacitance	$C_{oss}$		---	14.6	---	
Reverse Transfer Capacitance	$C_{rss}$		---	2.5	---	

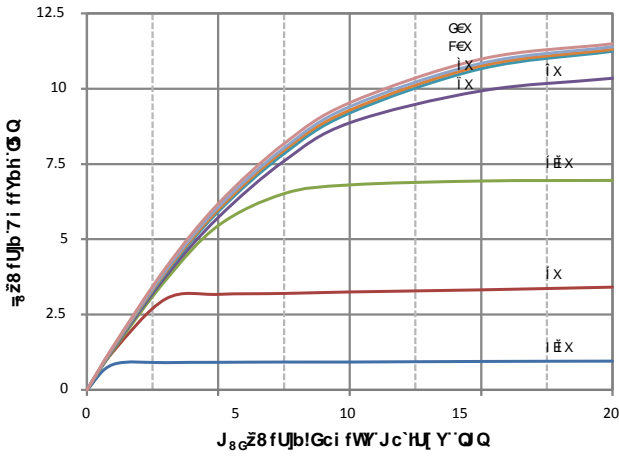
**Drain-Source Diode Characteristics**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	$I_S$	$T_C=25^{\circ}\text{C}$	---	---	6.6	A
Pulsed Source Current	$I_{SM}$		---	---	19.8	A
Diode Forward Voltage	$V_{SD}$	$V_G=0V, I_S=2.8A, T_J=25^{\circ}\text{C}$	---	---	1.3	V
Reverse Recovery Time	$t_{rr}$	$V_R=400V, I_F=2.8A, di_F/dt=100A/\mu s$	---	170	---	ns
Reverse Recovery Charge	$Q_{rr}$		---	1.1	---	$\mu C$

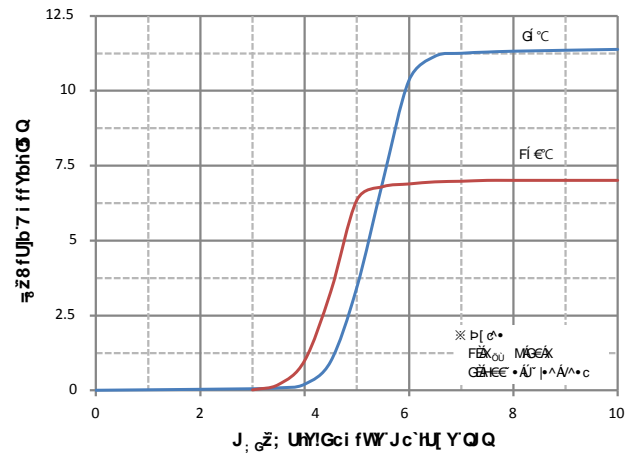
**Note:**

- Limited by  $T_{j,max}$ . Maximum Duty Cycle  $D = 0.50$
- Pulse width  $t_p$  limited by  $T_{j,max}$
- Identical low side and high side switch with identical  $R_{\theta}$
- $V_{DD}=50V, R_G=25\Omega, I_{AS}=6.3A$

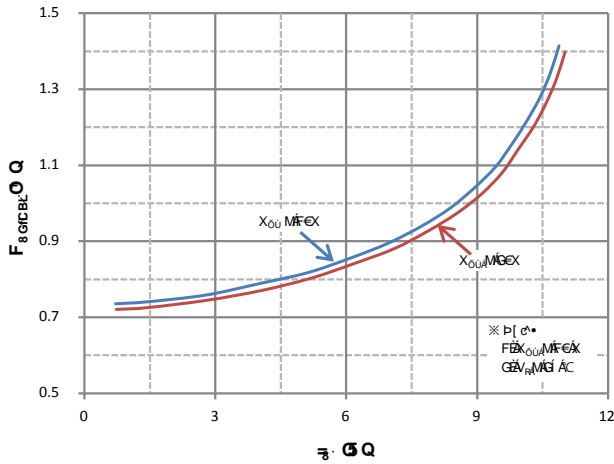
**Handl'WU 7\ UFUWYf]ghjVg**



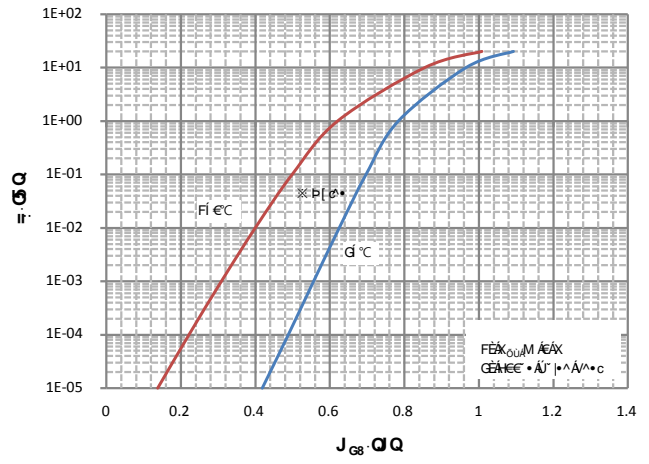
: [[ i fY%'Cb'FY] [cb'7\ UFUWYf]ghjVg



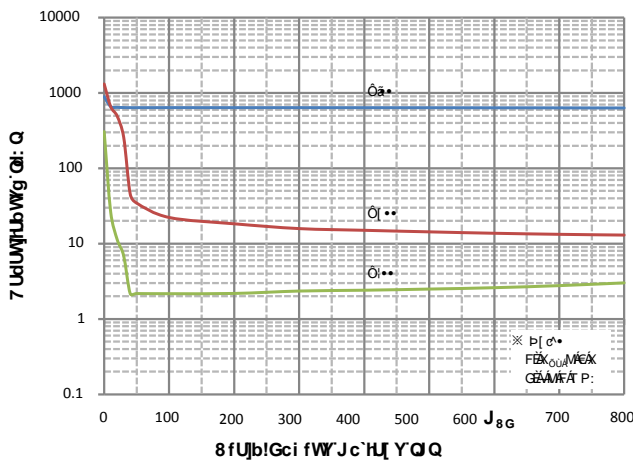
: [[ i fY'&'HfUbgZf'7\ UFUWYf]ghjVg



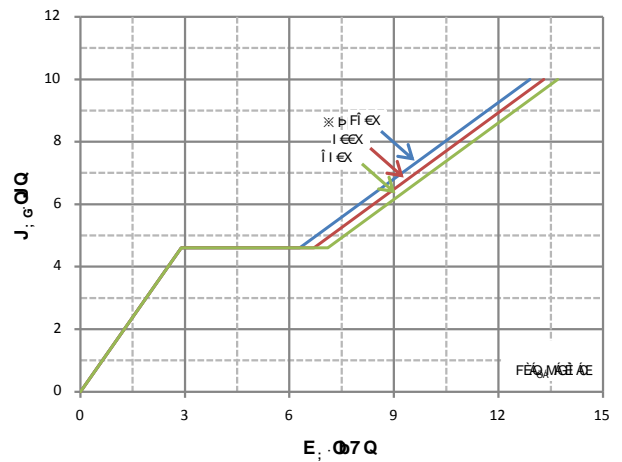
: [[ i fY' "Cb'FYg]ghUbw'JUF]U]cb'j'g'8fU]b'7i ffYbhUbx'; UH'Jc'HU] Y



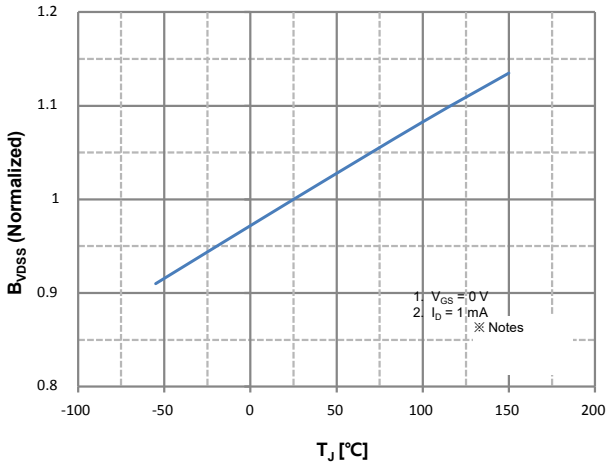
: [[ i fY('6cXm8]cXY: cfk UFX'Jc'HU] Y JUF]U]cb'k'Jh 'Gci fW'7i ffYbh UbX'HYa dYUhi fY



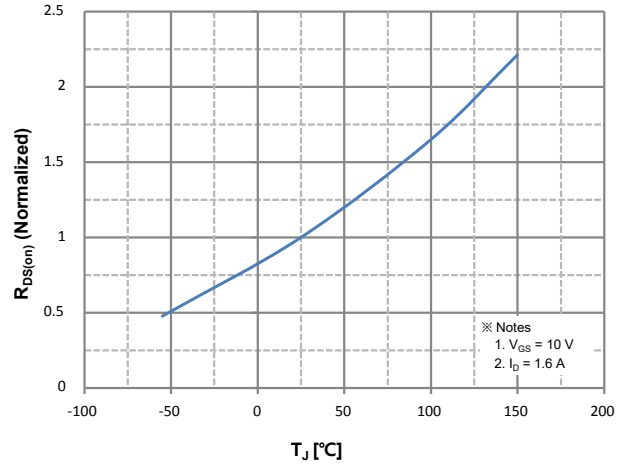
: [[ i fY)'7 UdUW]Ubw'7\ UFUWYf]ghjVg



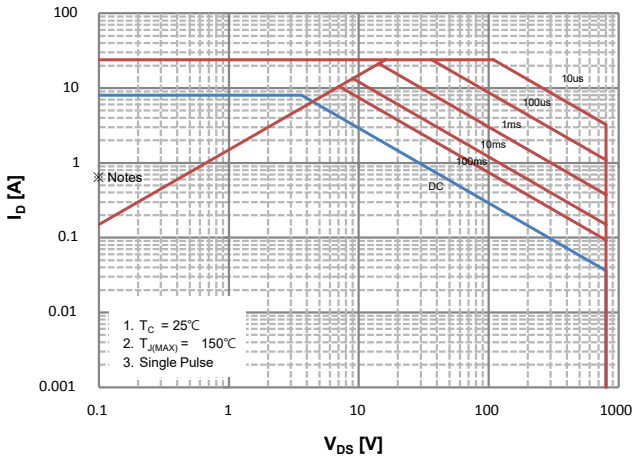
: [[ i fY\*'"; UH'7\ UF] Y7\ UFUWYf]ghjVg



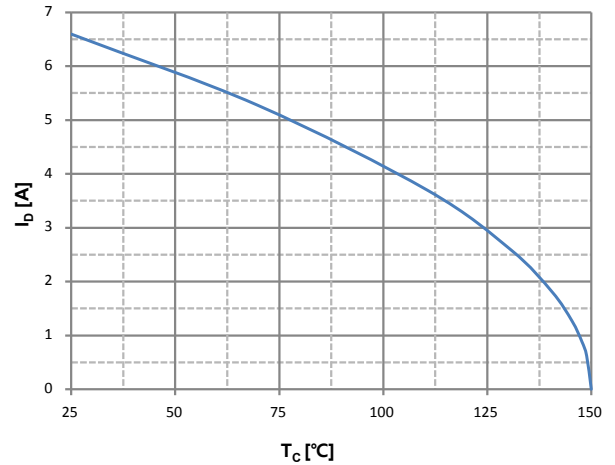
**Figure 7. Breakdown Voltage Variation vs. Temperature**



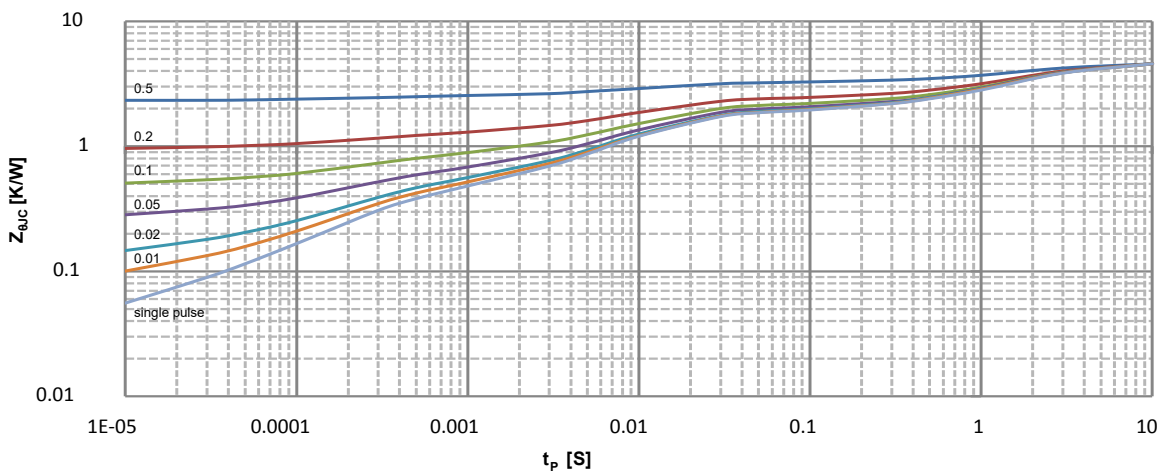
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. Transient Thermal Response Curve**

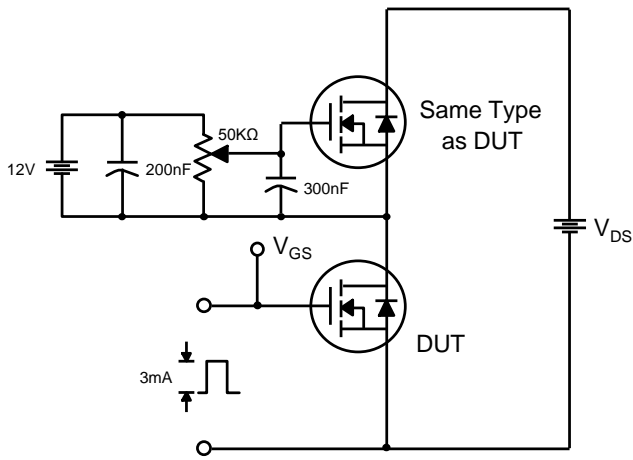


Fig 12. Gate Charge Test Circuit & Waveform

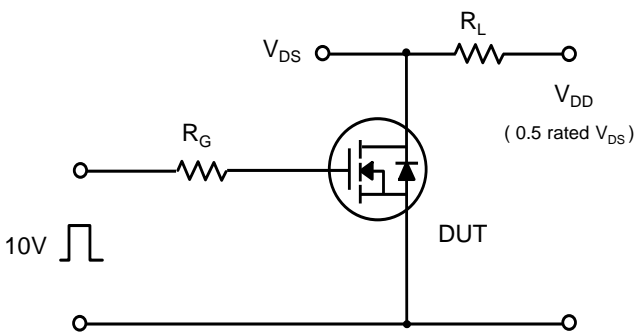


Fig 13. Resistive Switching Test Circuit & Waveforms

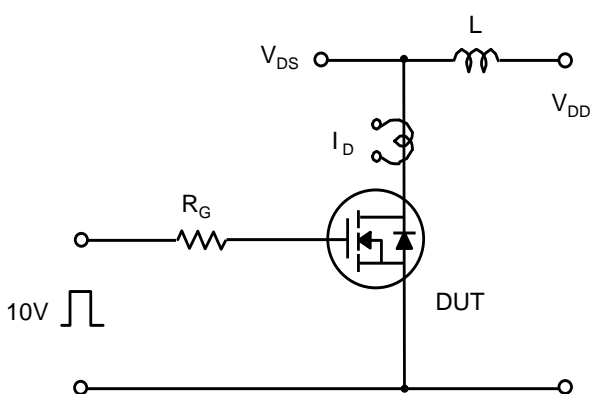
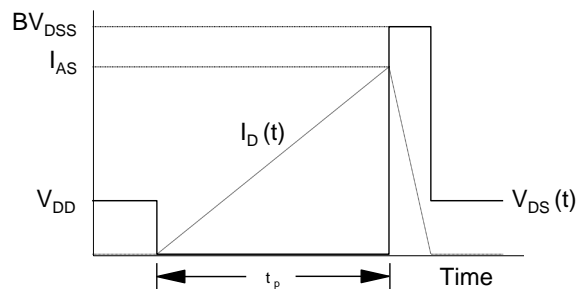
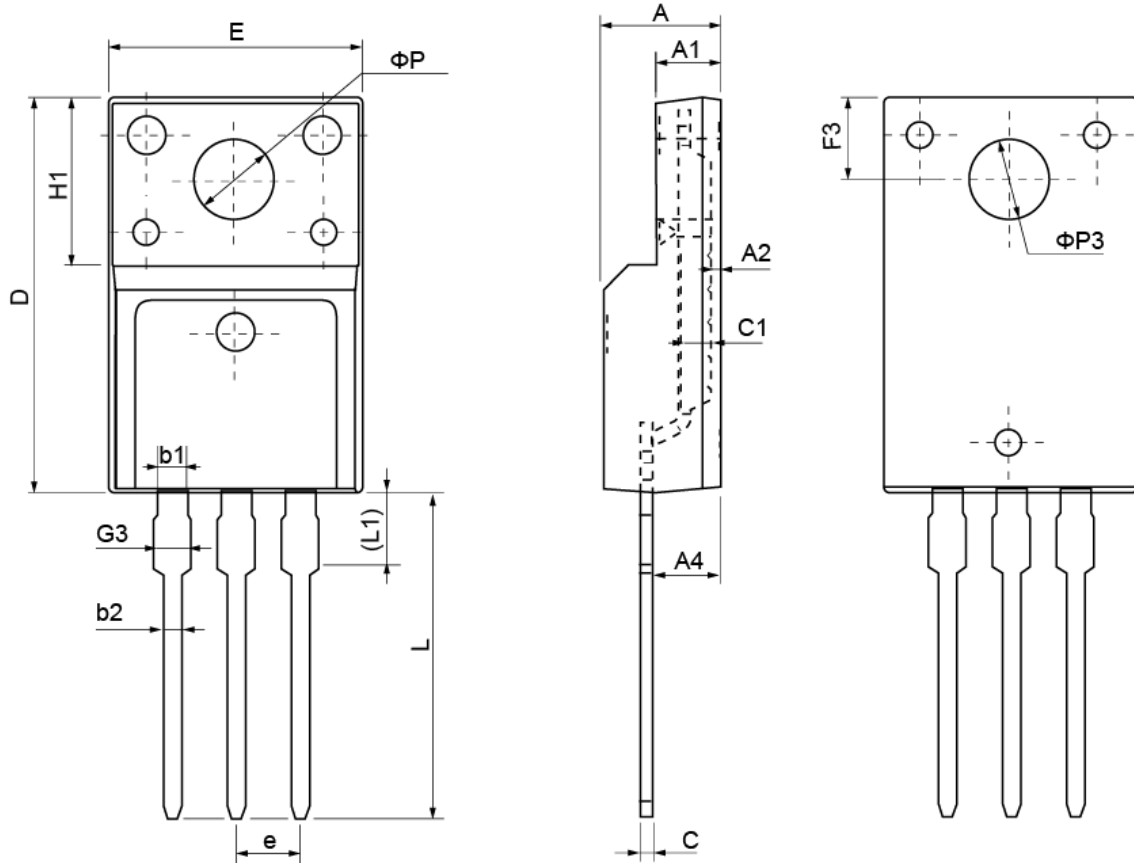


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



**TO-220F Package Outline Dimensions**



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
<b>A</b>	4.40	4.70	5.00	<b>H1</b>	6.70 REF		
<b>A1</b>	2.30	2.55	2.80	<b>L</b>	12.30	12.98	13.30
<b>A2</b>	0.30	0.50	0.70	<b>L1</b>	2.95	3.10	3.50
<b>A4</b>	2.45	2.80	3.05	<b>phi P</b>	3.03	3.20	3.50
<b>c</b>	0.30	0.50	0.70	<b>phi P3</b>	3.15	3.45	3.65
<b>c1</b>	1.20	1.30	1.40	<b>b1</b>	1.10	1.30	1.45
<b>D</b>	15.40	15.90	16.40	<b>b2</b>	0.60	0.80	1.00
<b>E</b>	9.86	10.16	10.46	<b>F3</b>	3.05	3.30	3.55
<b>e</b>	2.54 BSC			<b>G3</b>	1.15	1.35	1.55