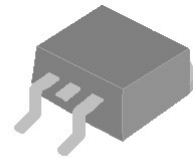
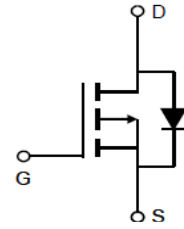


AP90P03K

P-Channel Power MOSFET

Features

- $V_{DS} = -30V$ I_D (at $V_{GS} = 10V$) = -90A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 7.5m Ω
- $R_{DS(ON)}$ (at $V_{GS} = 4.5V$) < 12m Ω
- Trench Power Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for Fast-switching Applications



TO-252(H)

Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	-30	V
Continuous Drain Current	I_D	$T_C = 25^\circ\text{C}$	-90
		$T_C = 100^\circ\text{C}$	-63
Pulsed Drain Current (note1)	I_{DM}	-360	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	135	mJ
Avalanche Current	I_{AS}	-30	A
Power Dissipation (note3)	P_D	$T_C = 25^\circ\text{C}$	79
		$T_C = 100^\circ\text{C}$	39.5
Operating Junction and Storage Temperature Range	T_J, T_{slg}	-55~+175	$^\circ\text{C}$

Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	2.5	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	

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P-Channel Power MOSFET

Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	-1	μA
		$V_{DS} = -30V, V_{GS} = 0V, T_J = 100^\circ\text{C}$	--	--	-25	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.7	-2.4	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -20A$	--	6.3	7.5	$m\Omega$
		$V_{GS} = -4.5V, I_D = -20A$	--	10	12	$m\Omega$
Forward Transconductance (Note3)	g_{fs}	$V_{DS} = -5V, I_D = -20A$	30	--	--	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = -15V,$ $f = 1.0\text{MHz}$	--	4942	--	pF
Output Capacitance	C_{oss}		--	473	--	
Reverse Transfer Capacitance	C_{rss}		--	461	--	
Total Gate Charge	Q_g	$V_{DD} = -15V, I_D = -20A,$ $V_{GS} = -10V$	--	82	--	nC
Gate-Source Charge	Q_{gs}		--	14	--	
Gate-Drain Charge	Q_{gd}		--	16	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15V, I_D = -20A,$ $R_G = 2.5\Omega$	--	182	--	ns
Turn-on Rise Time	t_r		--	262	--	
Turn-off Delay Time	$t_{d(off)}$		--	1.3	--	
Turn-off Fall Time	t_f		--	9.8	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	-90	A
Pulsed Diode Forward Current	I_{SM}		--	--	-360	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = -15A, V_{GS} = 0V$	--	--	-1.2	V
Reverse Recovery Time	t_{rr}	$I_F = -15A,$ $di_F/dt = 100A/\mu s$	--	34	--	ns
Reverse Recovery Charge	Q_{rr}		--	79	--	nC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = -30A, L = 0.3mH, V_{DD} = 30V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

P-Channel Power MOSFET

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

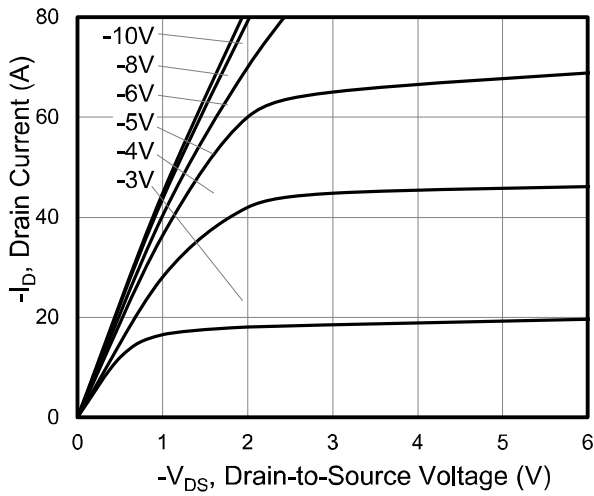


Figure 2. Transfer Characteristics

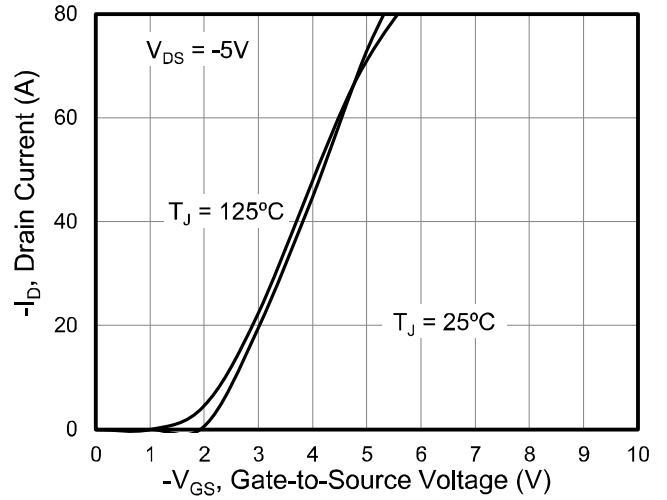


Figure 3. On-Resistance vs. Drain Current

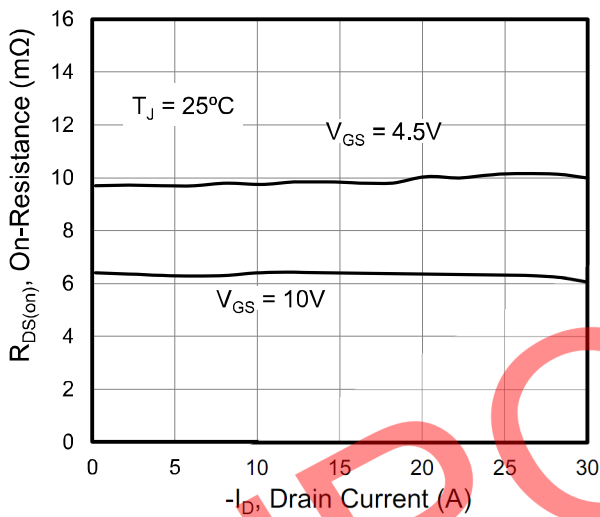


Figure 4. Capacitance

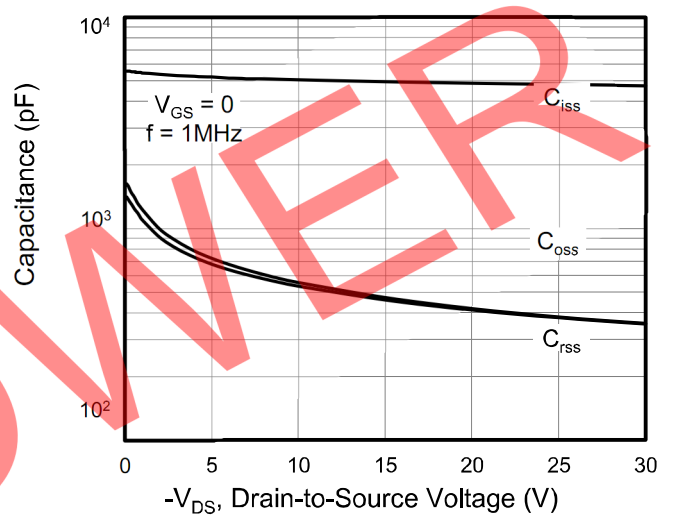


Figure 5. Gate Charge

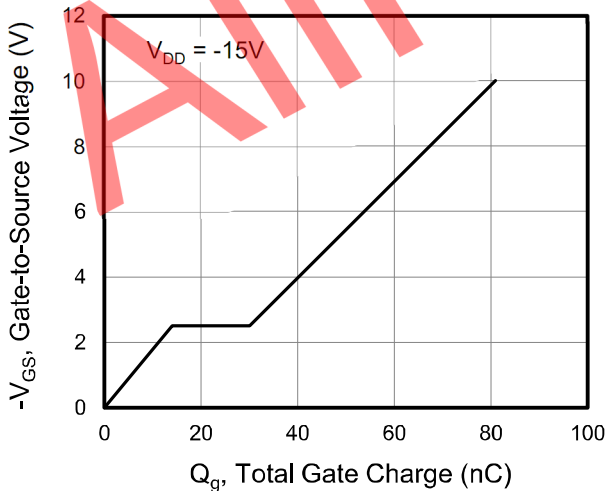
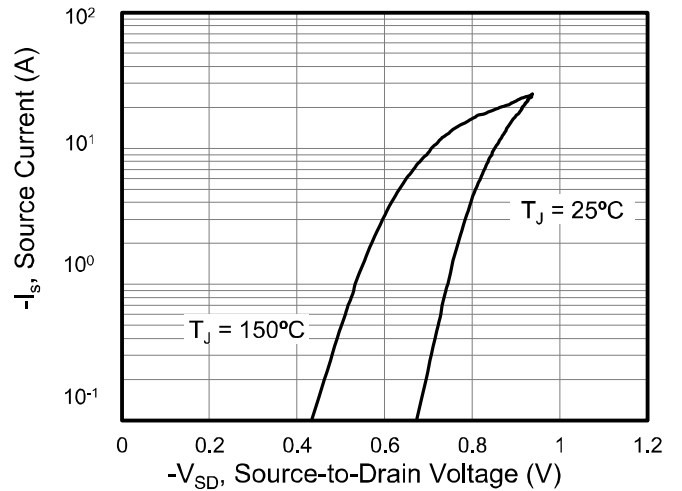


Figure 6. Body Diode Forward Voltage



P-Channel Power MOSFET

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

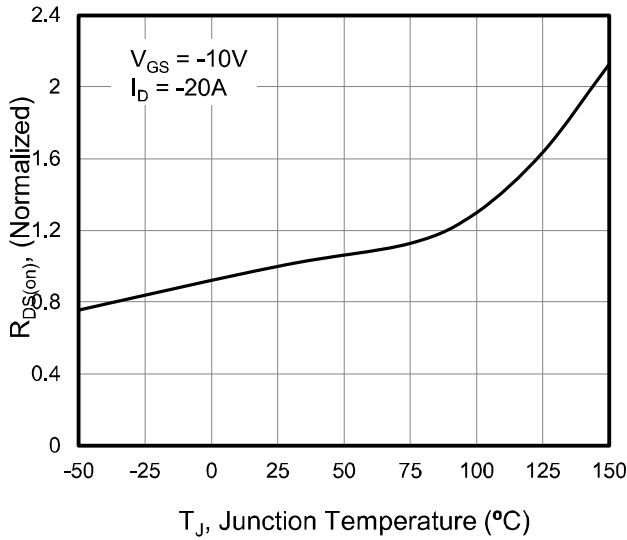


Figure 8. Threshold Voltage vs. Junction Temperature

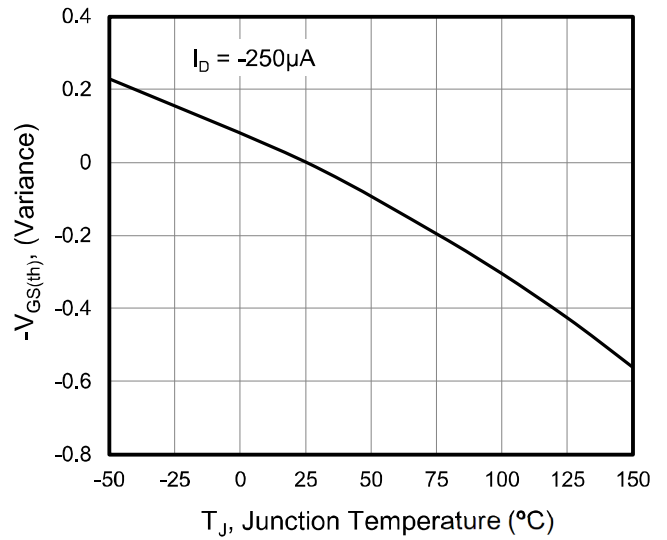


Figure 9. Transient Thermal Impedance

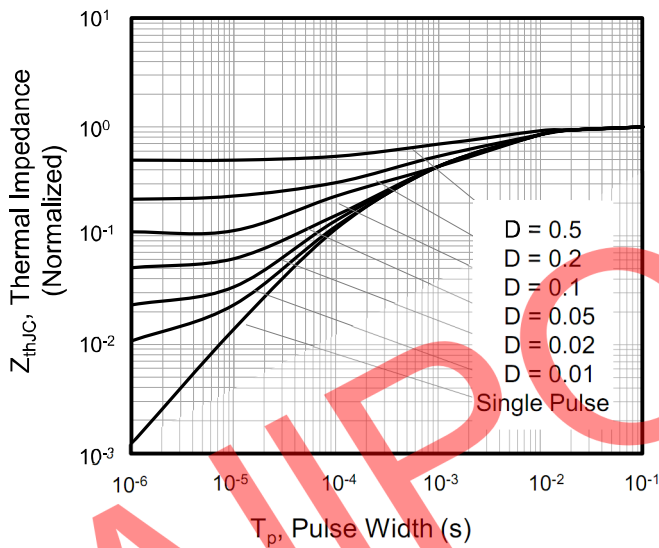
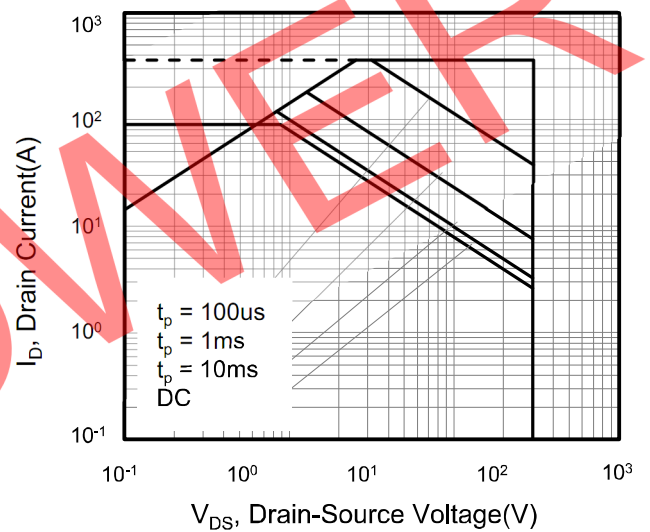


Figure 10. Safe operation area



P-Channel Power MOSFET

Figure A: Gate Charge Test Circuit and Waveform

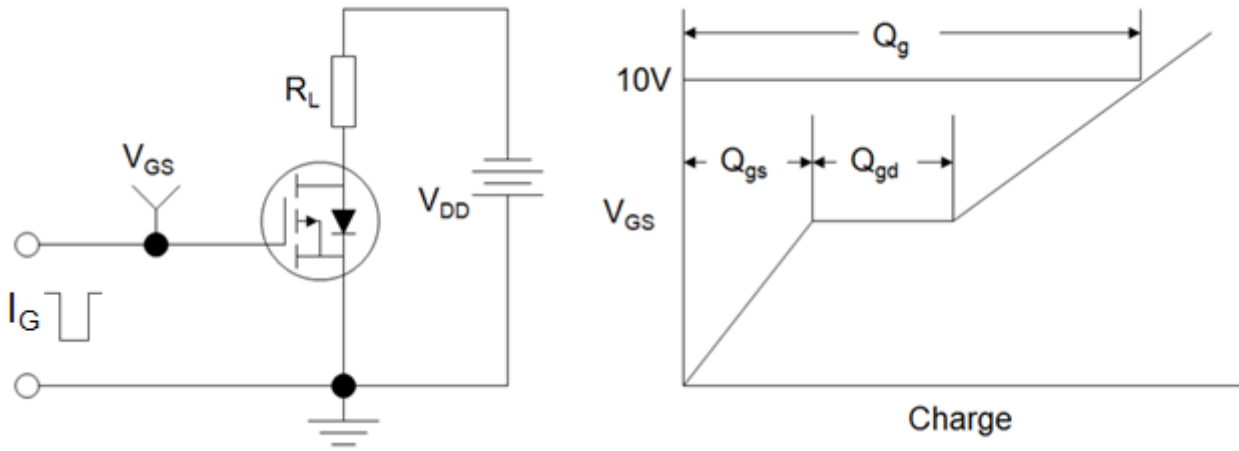


Figure B: Resistive Switching Test Circuit and Waveform

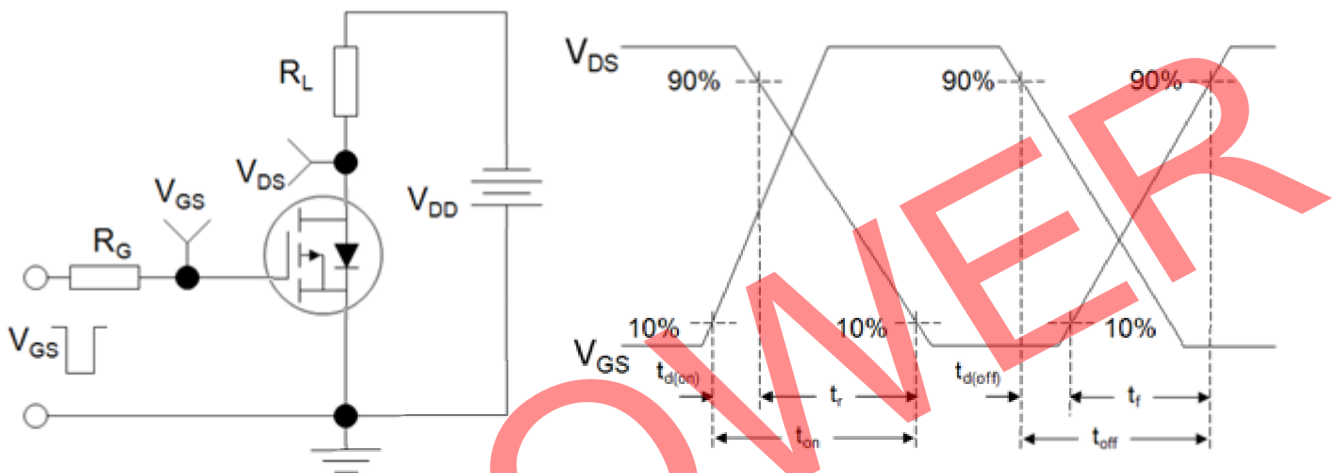
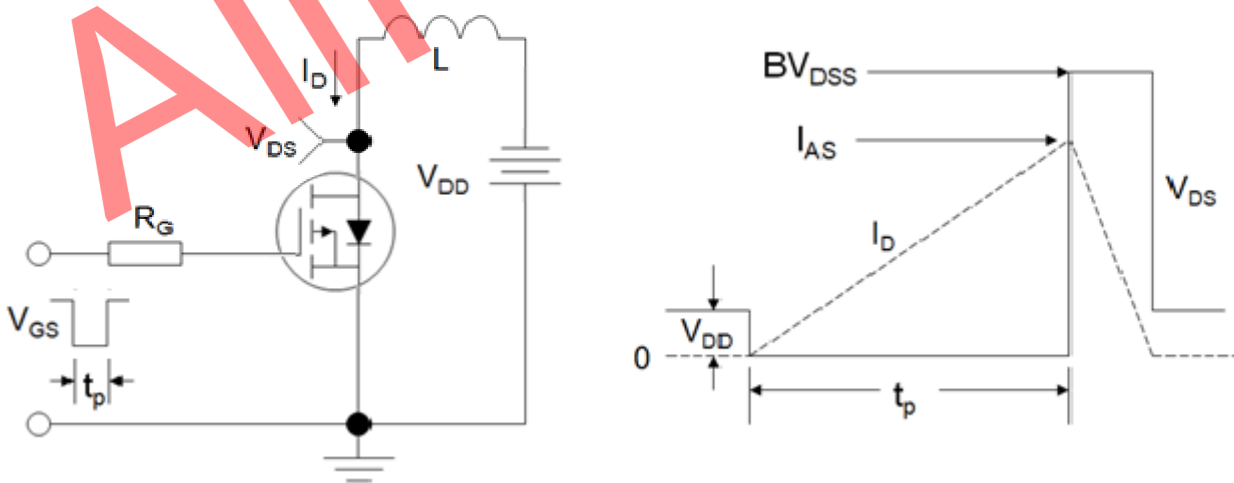


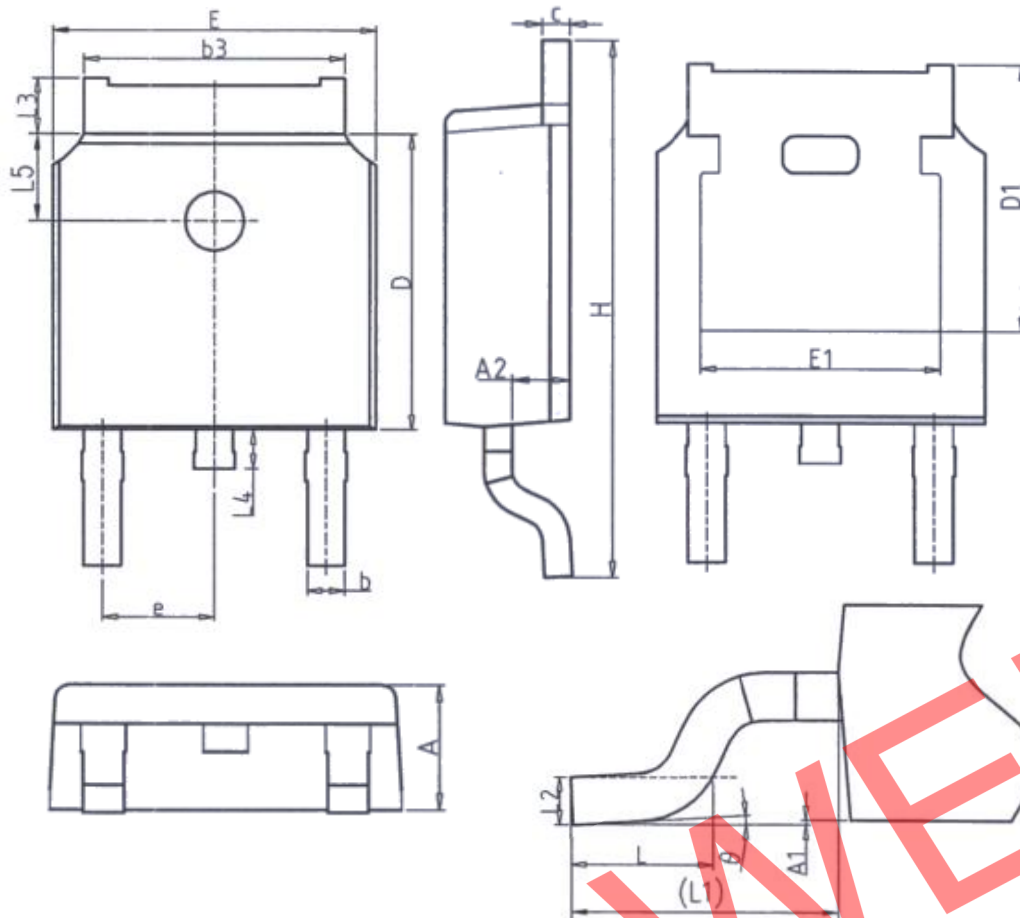
Figure C: Unclamped Inductive Switching Test Circuit and Waveform



AP90P03K

P-Channel Power MOSFET

TO-252



Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A1	0.00	0.20
A2	0.97	1.17
b	0.68	0.90
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22
D1	5.30REF	
E	6.40	6.80
E1	4.63	-

Unit: mm		
Symbol	Min.	Max.
e	2.286BSC	
H	9.40	10.50
L	1.38	1.75
L1	2.90REF	
L2	0.51BSC	
L3	0.88	1.28
L4	-	1.00
L5	1.65	1.95
θ	0°	8°