★ Green Device Available
★ Super Low Gate Charge
★ Excellent CdV/dt effect decline
★ Advanced high cell density Trench technology
★ 100% EAS Guaranteed

Product Summary

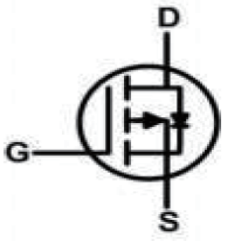
RoHS

BVDSS	RDSON	ID
-40V	13.5mΩ	-40A

Description

The 40P04 is the high cell density trenched P-ch MOSFETs, which provides excellent RDSON and gate charge for most of the the synchronous buck converter applications. The 40P04 meets the RoHS and Green Product requirement 100% EAS Guaranteed with full function reliability approved.

TO252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
V_{DSS}	Drain-Source Voltage		-40	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25℃	-40	A
		T_C = 100℃	-22	A
I_{DM}	Pulsed Drain Current note1		-140	A
EAS	Single Pulsed Avalanche Energy note2		57.8	mJ
P_D	Power Dissipation	T_C = 25℃	40.3	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		3.1	℃/W
$R_{\theta JA}$	Thermal Resistance from Junction-to-Ambient note3		66	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	℃

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

Symbol	Parameter		Test condition	Min.	Typ.	Max.	Units
Static Characteristics							
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		V_{GS} = 0V, I_D = -250μA	-40	-	-	V
I_{GSS}	Gate-Body Leakage Current		V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	T_J=25°C	V_{DS} = -60V, V_{GS} = 0V	-	-	-1	μA
		T_J=100°C		-	-	-100	
$V_{GS(th)}$	Gate-Threshold Voltage		V_{DS} = V_{GS}, I_D = -250μA	-1	-1.5	-2.2	V
$R_{DS(on)}$	Drain-Source on-Resistance[4]		V_{GS} = 10V, I_D =-20A	-	13.5	19	mΩ
			V_{GS} = -4.5V, I_D =-15A	-	19.5	25	
g_{fs}	Forward Transconductance[4]		V_{DS} = -10V, I_D = -20A	-	44	-	S
Dynamic Characteristics[5]							
C_{iss}	Input Capacitance		V_{DS} = -20V, V_{GS} =0V, f =1MHz	-	2525	-	pF
C_{oss}	Output Capacitance			-	190	-	
C_{rss}	Reverse Transfer Capacitance			-	172	-	
R_G	Gate Resistance		f =1MHz	-	10	-	Ω
Switching Characteristics[5]							
Q_g	Total Gate Charge		V_{GS} = -10V, V_{DD} =-20V, I_D= -20A	-	22	-	nC
Q_{gs}	Gate-Source Charge			-	4.2	-	
Q_{gd}	Gate-Drain Charge			-	6.9	-	
$t_{d(on)}$	Turn-on Delay Time		V_{GS} =-10V, V_{DD} = -20V, R_G = 3Ω, I_D= -20A	-	6.4	-	ns
t_r	Rise Time			-	15.3	-	
$t_{d(off)}$	Turn-off Delay Time			-	25	-	
t_f	Fall Time			-	7.6	-	
Drain-Source Body Diode Characteristics							
V_{SD}	Diode Forward Voltage[4]		I_S = -20A, V_{GS} = 0V	-	-	-1.2	V
I_S	Continuous Source Current	T_C=25°C	-	-	-	-40	A

Notes:
1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
2. The EAS data shows Max. rating . The test condition is V_{DD}= -25V, V_{GS}= -10V, L= 0.1mH, IAS= -34A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ⩽ 300us , duty cycle ⩽ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical and Thermal Characteristics (Curves)

Figure1: Output Characteristics

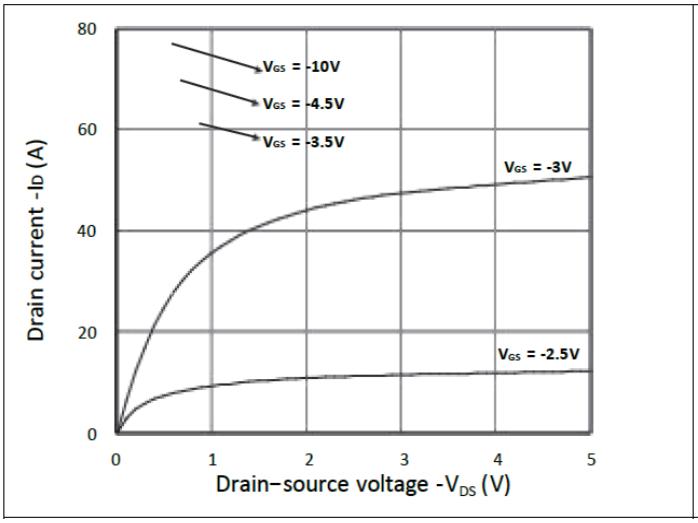


Figure 2: Transfer Characteristics

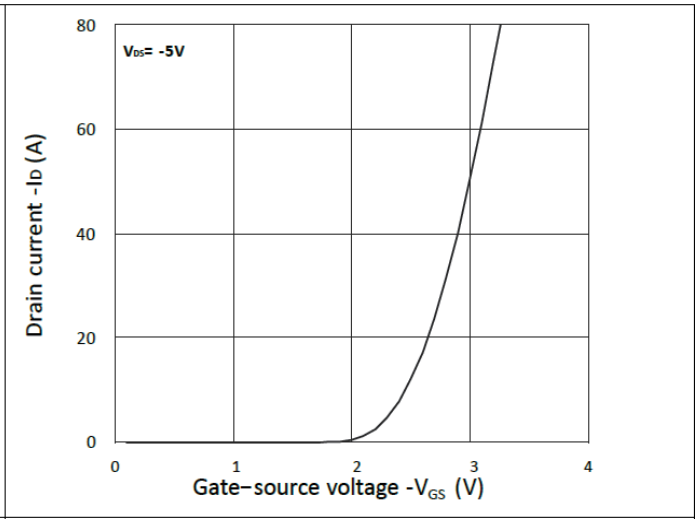


Figure 3:Forward Characteristics of Reve

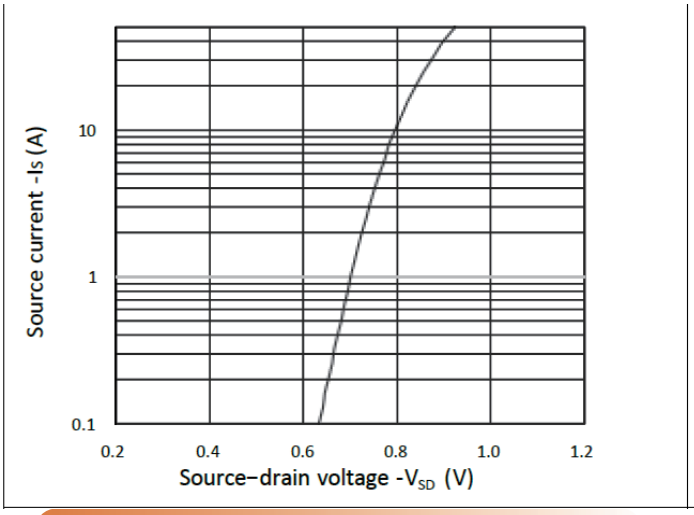


Figure 4:RDS(ON) vs . VGS

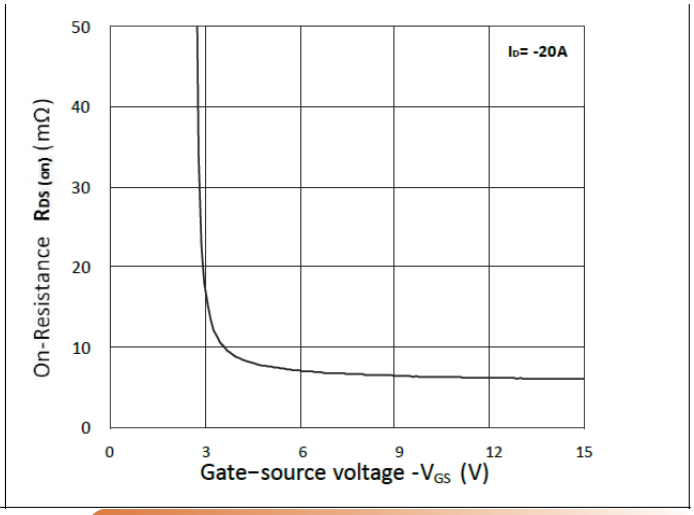


Figure 5: RDS(ON) vs . ID

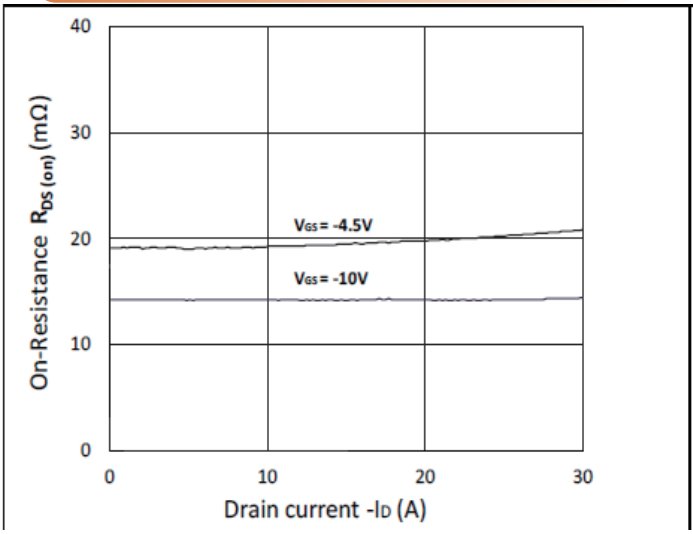
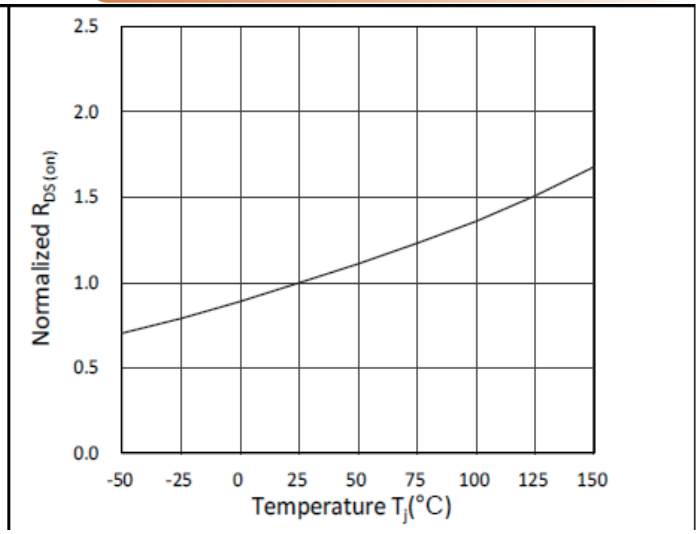


Figure 6:Normalized RDS(on) vs . Tempe



Typical Performance Characteristics

Figure 7:Capacitance Characteristics

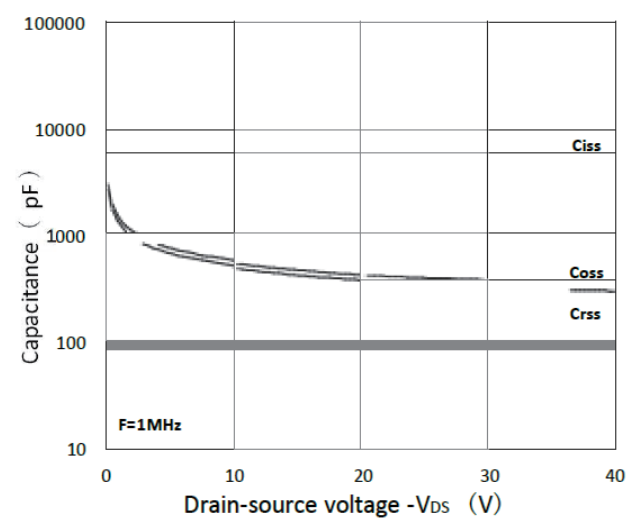


Figure 8: Gate Charge Characteristics

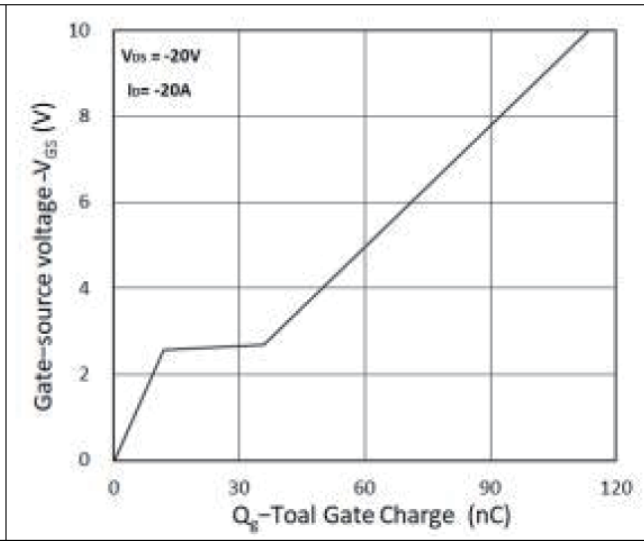


Figure 9: Power Dissipational Impedance

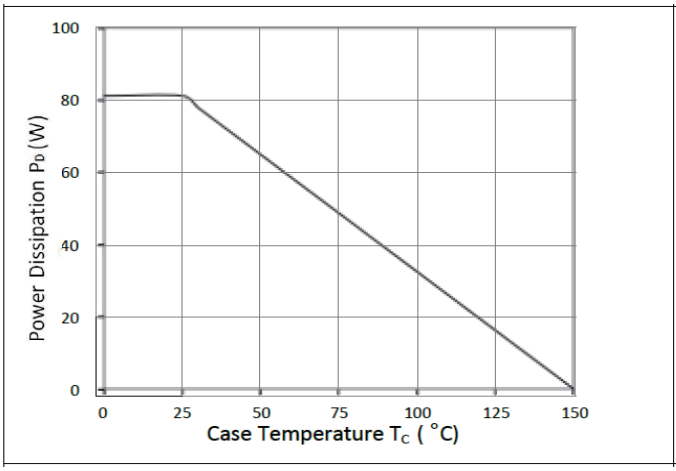


Figure 10: Safe Operating Area

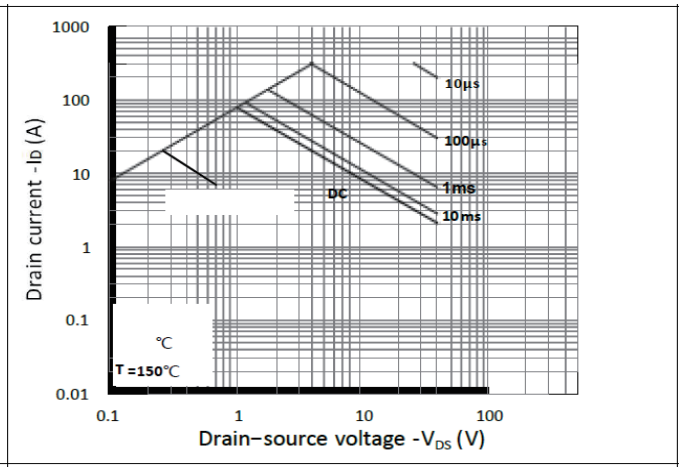
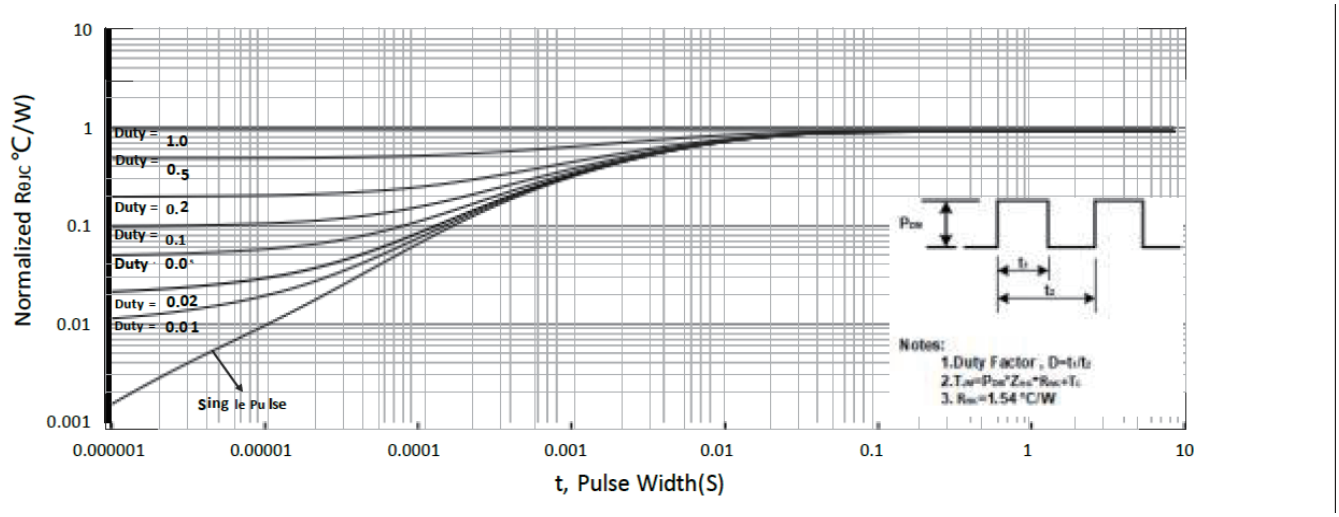


Figure 11: Normalized Maximum Transient



Test Circuit

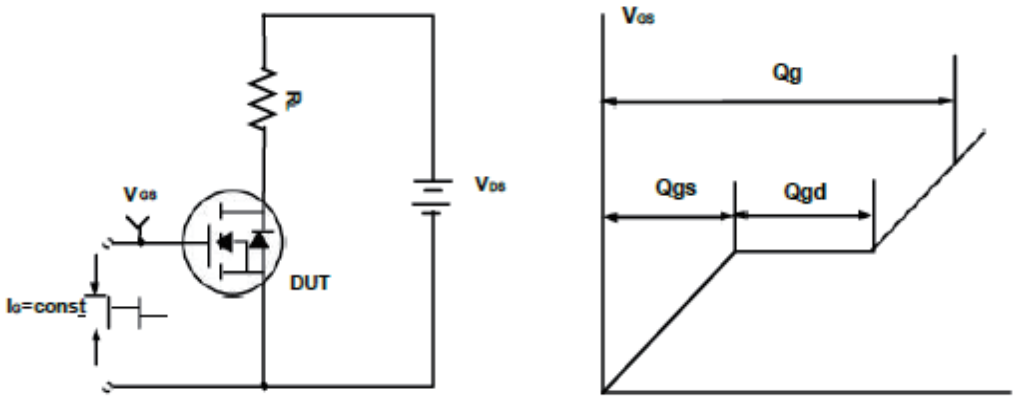


Figure A. Gate Charge Test Circuit & Waveforms

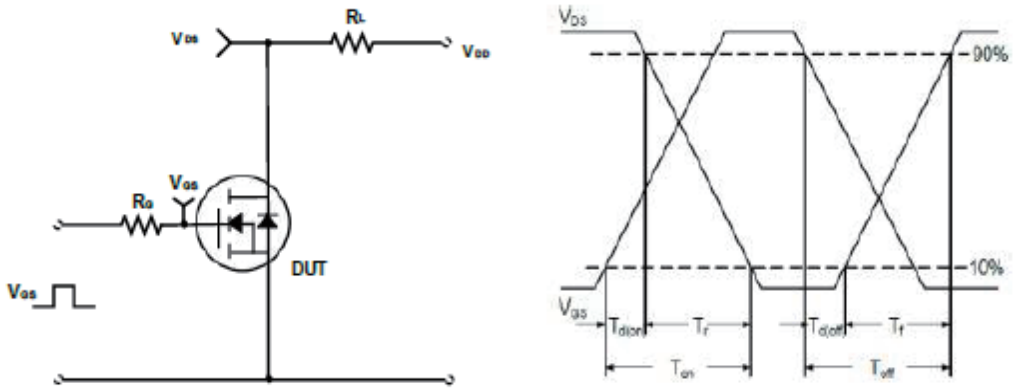


Figure B. Switching Test Circuit & Waveforms

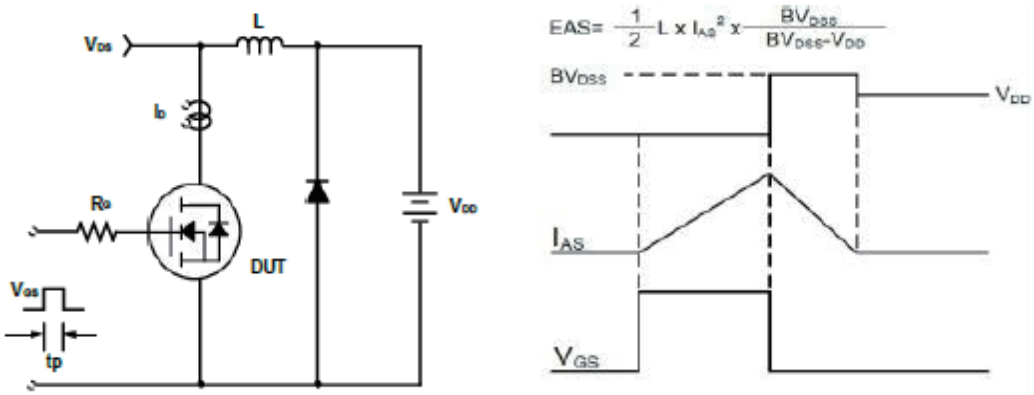
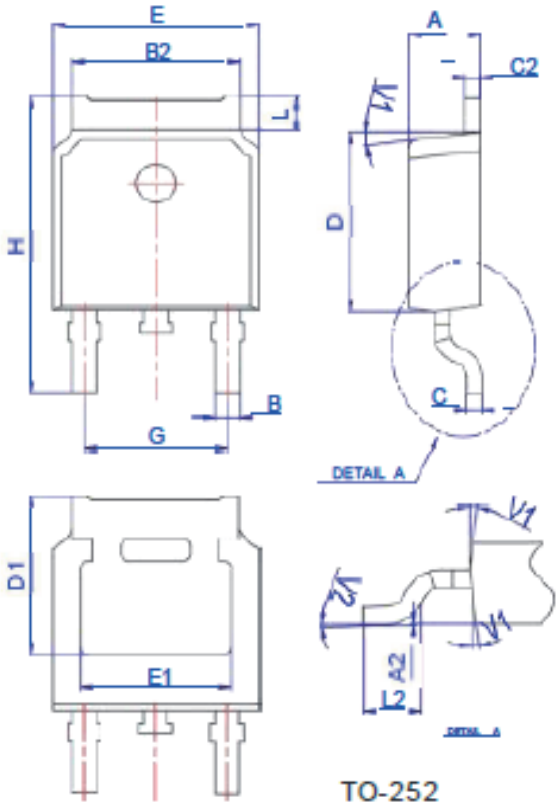


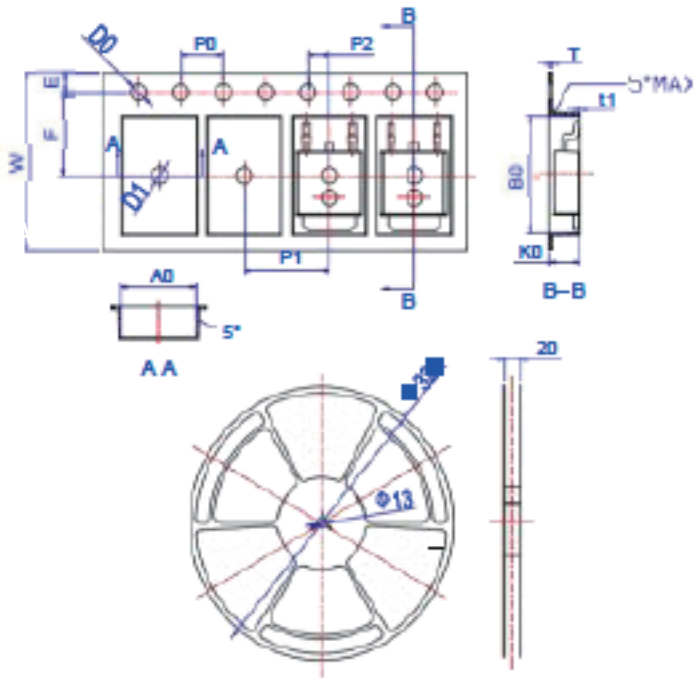
Figure C. Unclamped Inductive Switching Circuit & Waveforms

Package Mechanical Data-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Reel Spectification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583