



STD1703L

N-CHANNEL 30V - 0.038Ω - 17A - DPAK

STripFET™ II MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STD1703L	30 V	<0.05 Ω	17 A

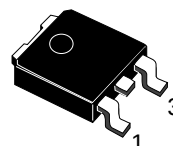
- TYPICAL R_{DS(on)} = 0.038 Ω
- APPLICATION ORIENTED CHARACTERIZATION

DESCRIPTION

This MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

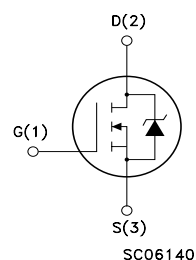
APPLICATIONS

- DC-DC CONVERTERS
- LINEAR POST REGULATION



DPAK

INTERNAL SCHEMATIC DIAGRAM



ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STD1703LT4	D1703L	DPAK	TAPE & REEL

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage ($V_{GS} = 0$)	30	V
V_{DGR}	Drain-gate Voltage ($R_{GS} = 20\text{ k}\Omega$)	30	V
V_{GS}	Gate- source Voltage	± 20	V
I_D	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	17	A
I_D	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	12	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	68	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	20	W
	Derating Factor	0.13	W/ $^\circ\text{C}$
dv/dt (1)	Peak Diode Recovery voltage slope	6	V/ns
E_{AS} (2)	Single Pulse Avalanche Energy	200	mJ
T_{stg}	Storage Temperature	-65 to 175	$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	175	$^\circ\text{C}$

($\bullet$) Pulse width limited by safe operating area

(1) $I_{SD} \leq 17\text{A}$, $di/dt \leq 300\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$.

(2) Starting $T_j = 25^\circ\text{C}$, $I_D = 11\text{A}$, $V_{DD} = 15\text{V}$

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case Max	7.5	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	62.5	$^\circ\text{C}/\text{W}$
T_l	Maximum Lead Temperature For Soldering Purpose	275	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_{CASE} = 25^\circ\text{C}$ UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	30			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 15\text{V}$			± 100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1			V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{V}$, $I_D = 8.5\text{ A}$ $V_{GS} = 5\text{ V}$, $I_D = 8.5\text{ A}$		0.038 0.045	0.05 0.06	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D = 11\text{A}$		7		S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		330		pF
C_{oss}	Output Capacitance			90		pF
C_{rss}	Reverse Transfer Capacitance			40		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15V, I_D = 8.5A$		11		ns
t_r	Rise Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		100		ns
Q_g	Total Gate Charge	$V_{DD} = 24V, I_D = 17A,$ $V_{GS} = 10V$		6.5	9	nC
Q_{gs}	Gate-Source Charge			3.6		nC
Q_{gd}	Gate-Drain Charge			2		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 15V, I_D = 8.5A,$		25		ns
t_f	Fall Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		22		ns
$t_{r(off)}$	Off-voltage Rise Time	$V_{clamp} = 24V, I_D = 17A$		22		ns
t_f	Fall Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$		55		ns
t_c	Cross-over Time	(see test circuit, Figure 5)		75		ns

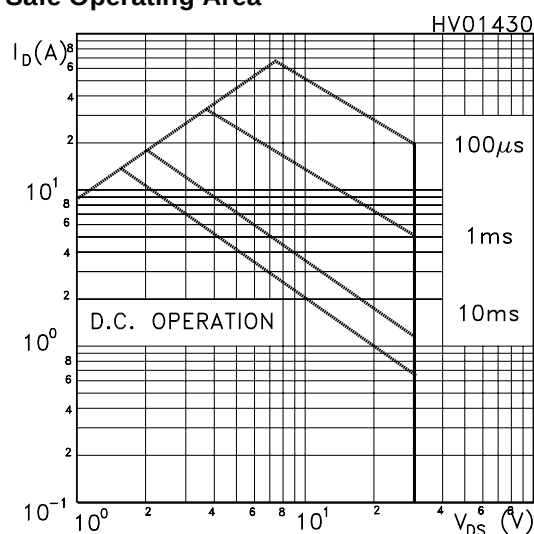
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				17	A
$I_{SDM} (1)$	Source-drain Current (pulsed)				68	A
$V_{SD} (2)$	Forward On Voltage	$I_{SD} = 17A, V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 17A, di/dt = 100A/\mu s,$		30		ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = 15V, T_J = 150^\circ C$		18		nC
I_{RRM}	Reverse Recovery Current	(see test circuit, Figure 5)		1.2		A

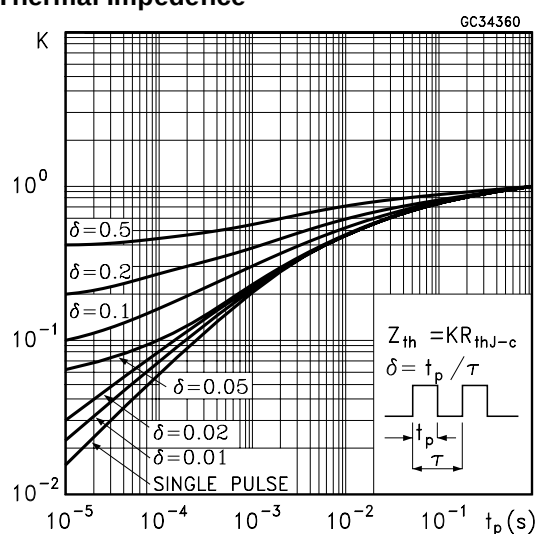
Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

2. Pulse width limited by safe operating area.

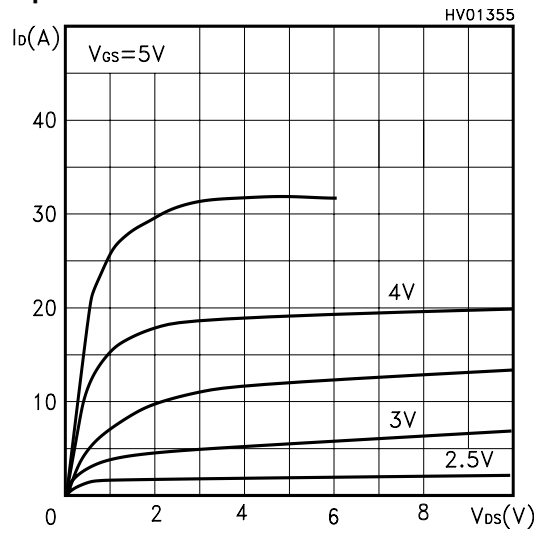
Safe Operating Area



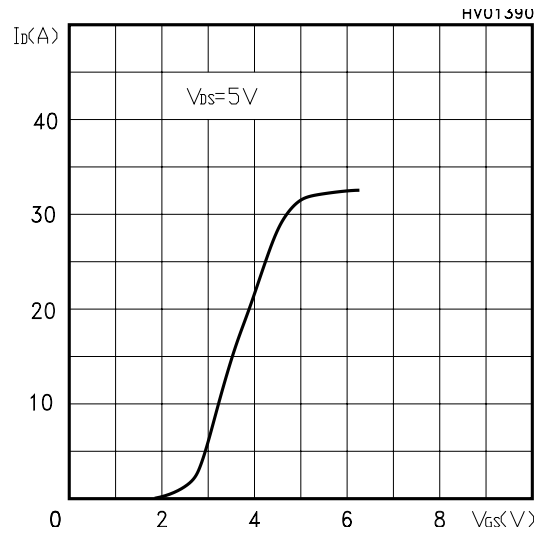
Thermal Impedence



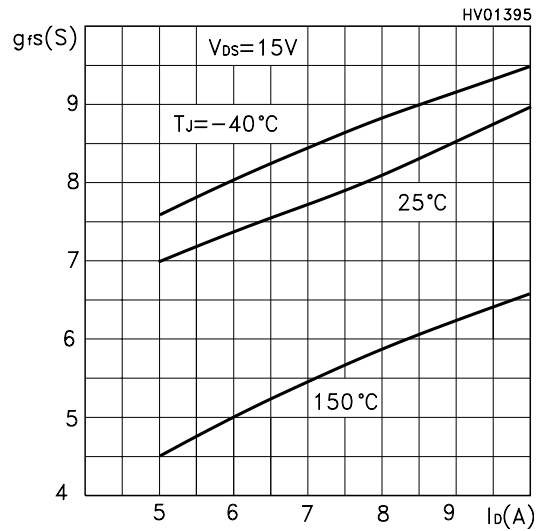
Output Characteristics



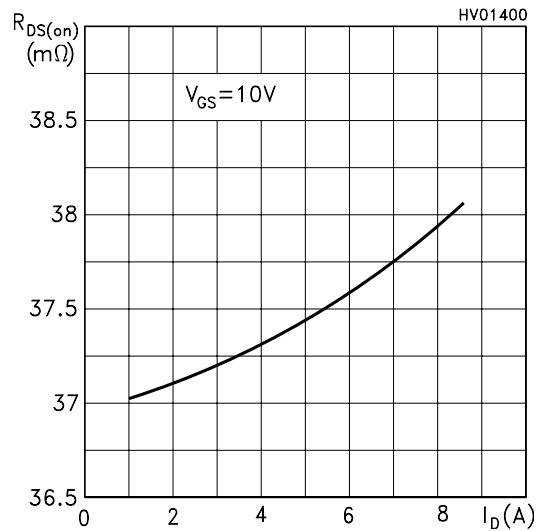
Transfer Characteristics



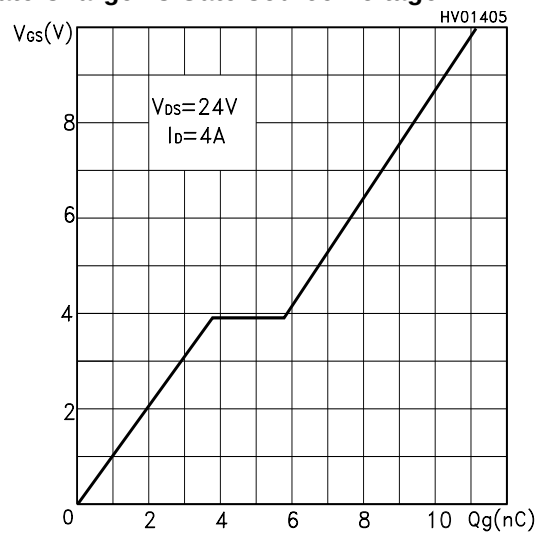
Transconductance



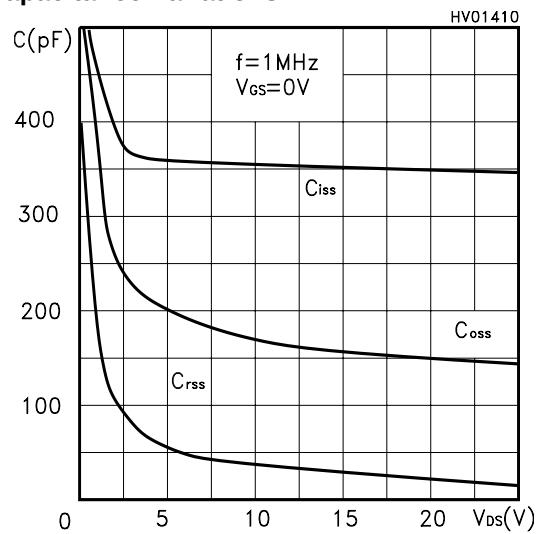
Static Drain-source On Resistance



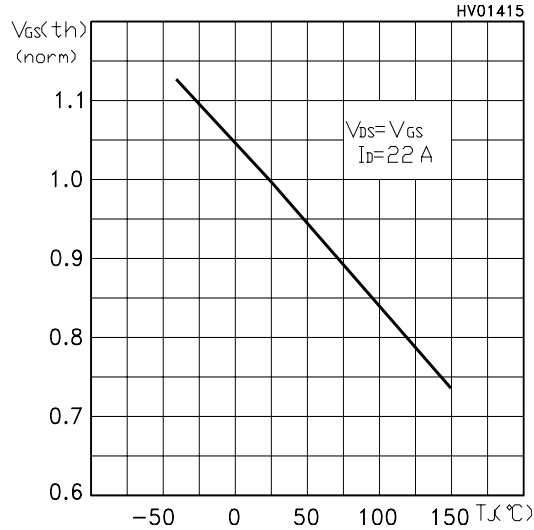
Gate Charge vs Gate-source Voltage



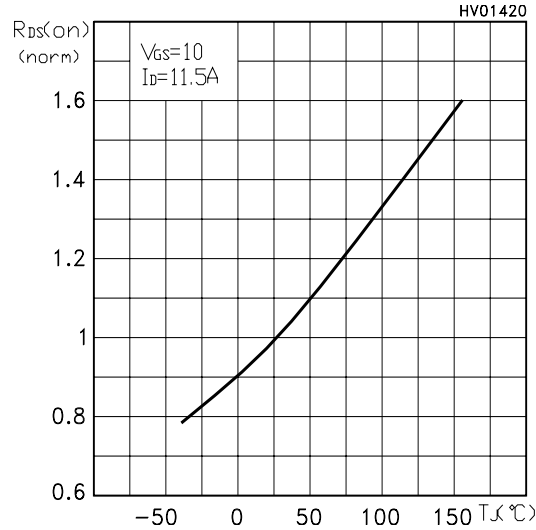
Capacitance Variations



Normalized Gate Thershold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

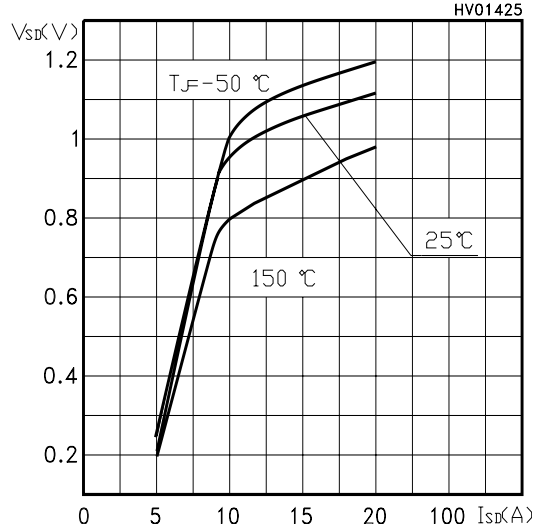


Fig. 1: Unclamped Inductive Load Test Circuit

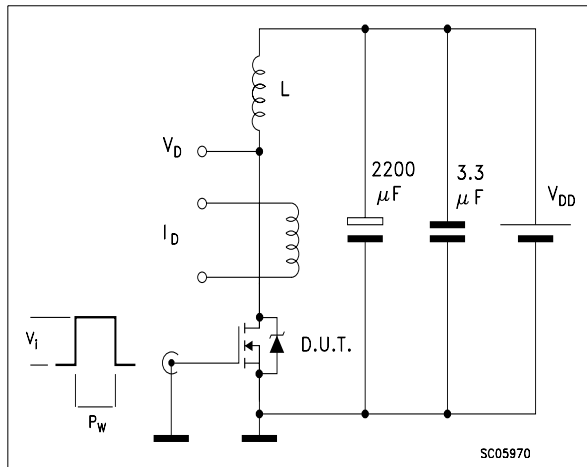


Fig. 2: Unclamped Inductive Waveform

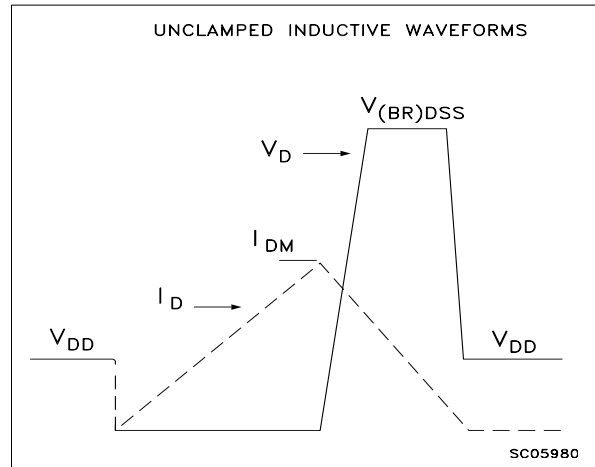


Fig. 3: Switching Times Test Circuit For Resistive Load

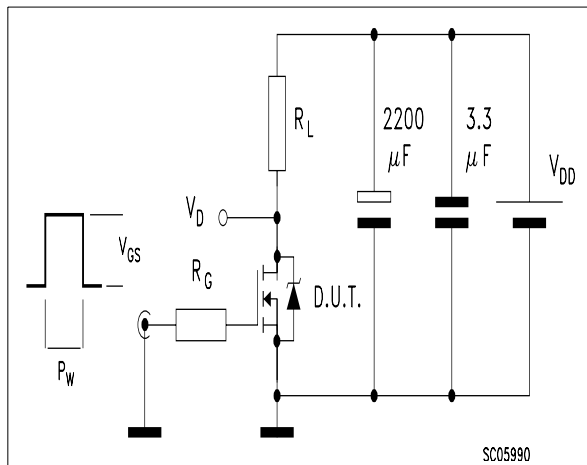


Fig. 4: Gate Charge test Circuit

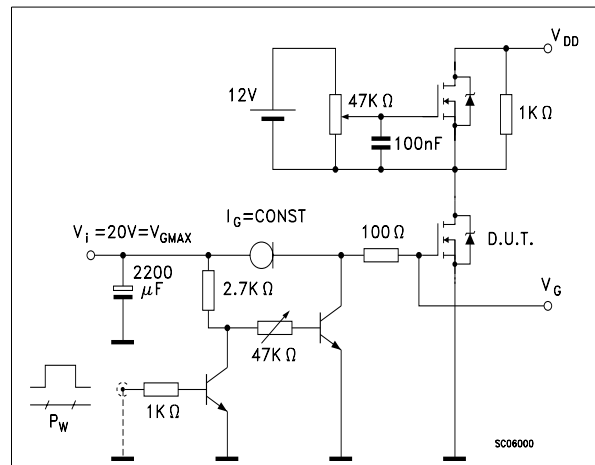
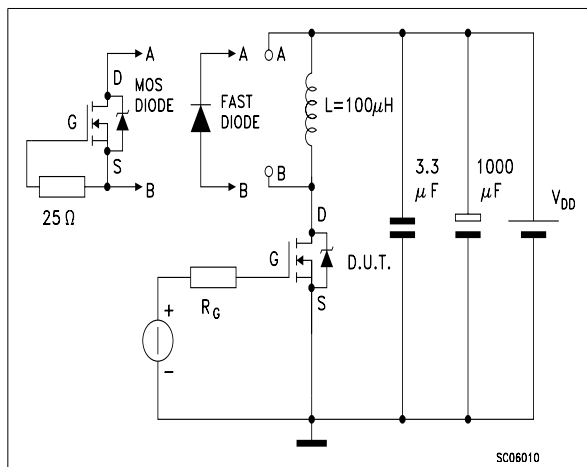
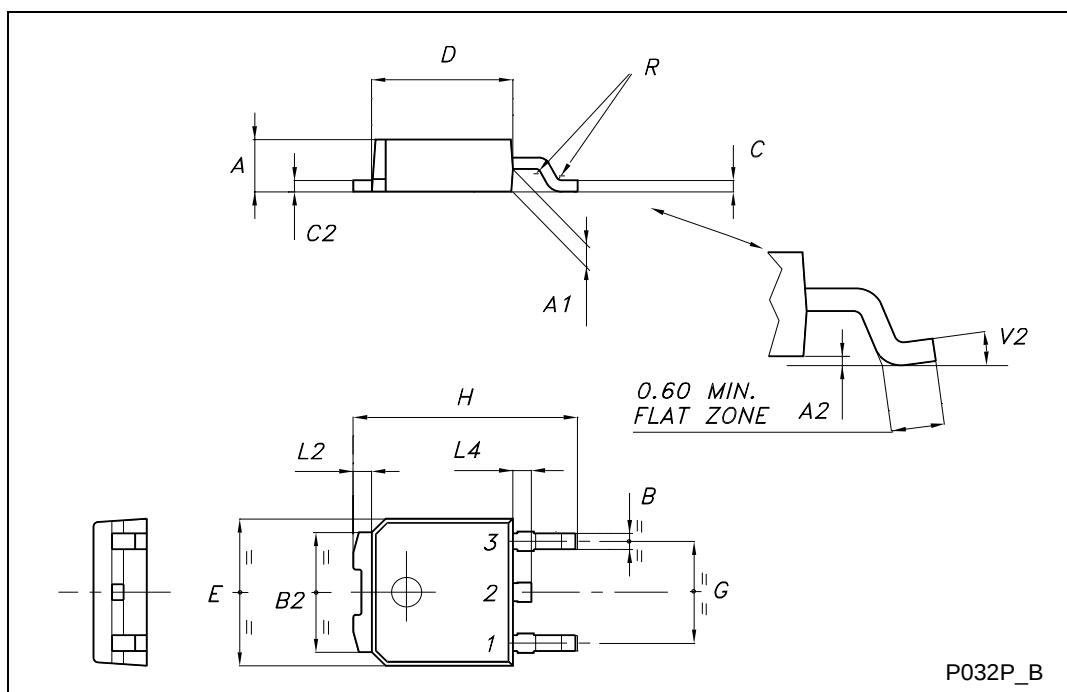


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



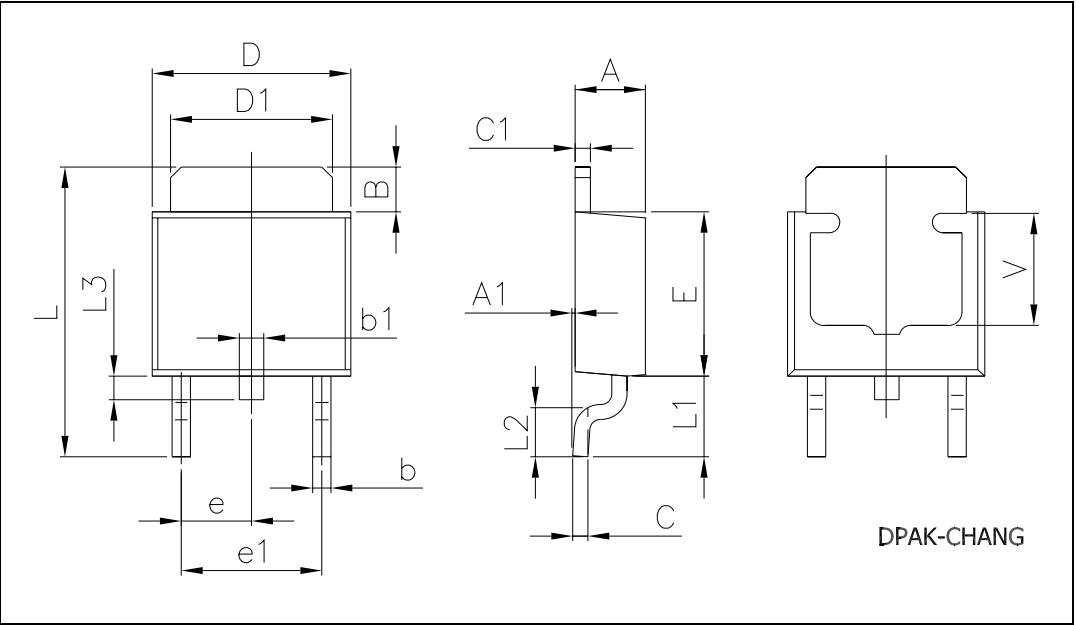
TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°

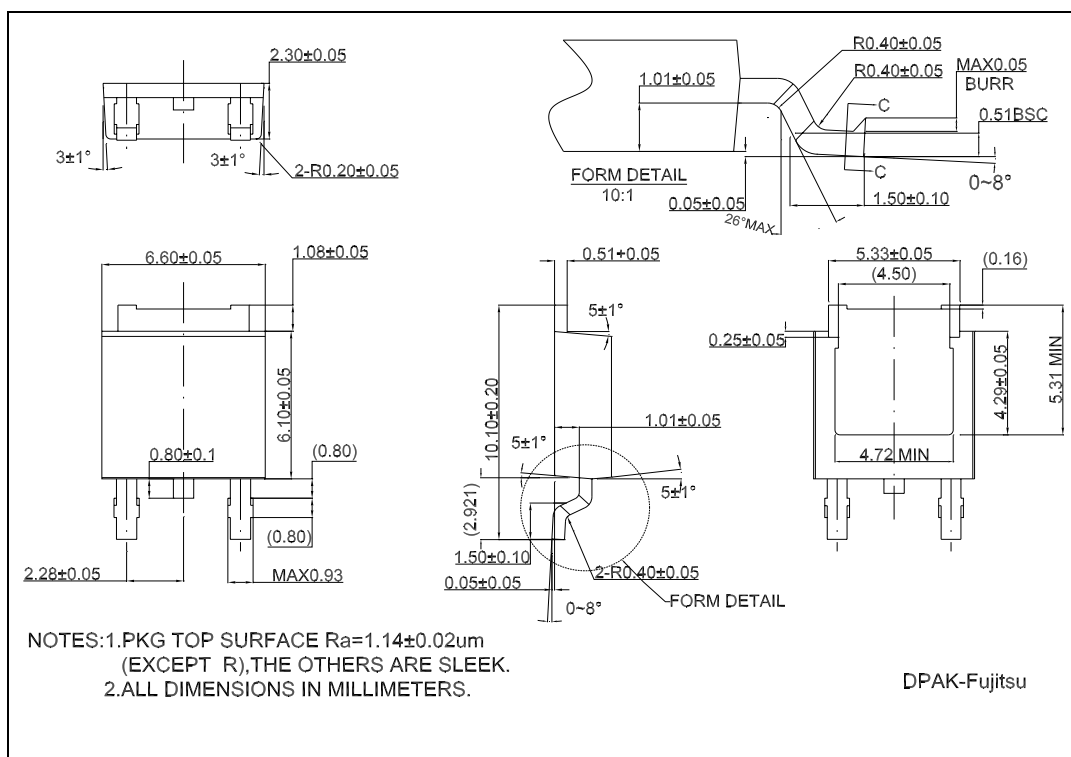
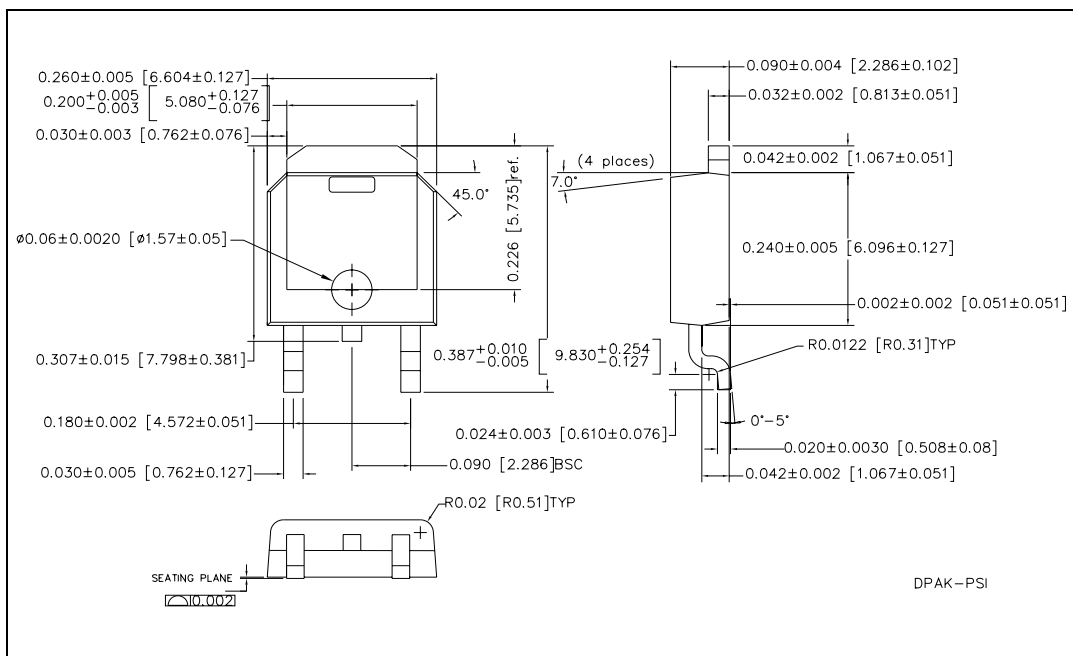


TO-252 (DPAK) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.00		0.127	0.00		0.005
B	1.350		1.650	0.053		0.065
b	0.50		0.70	0.020		0.028
b1	0.70		0.90	0.028		0.035
c	0.430		0.580	0.017		0.023
c1	0.430		0.580	0.017		0.023
D	6.350		6.650	0.250		0.262
D1	5.20		5.40	0.205		0.213
E	5.40		5.70	0.213		0.224
e		2.30			0.091	
e1	4.50		4.70	0.177		0.185
L	9.50		9.90	0.374		0.390
L1	2.550		2.900	0.10		0.114
L2	1.40		1.780	0.055		0.070
L3	0.35		0.65	0.014		0.026
V	3.80 REF			0.150 REF		



TO-252 (DPAK) MECHANICAL DATA



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