

## SST60R2K3S-VB Datasheet

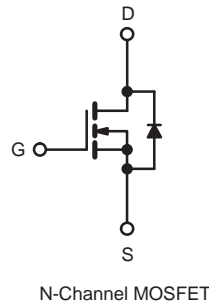
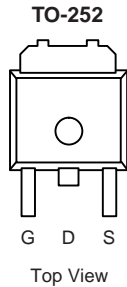
## N-Channel 600V (D-S) Super Junction Power MOSFET

**PRODUCT SUMMARY**

$V_{DS}$ (V)	600	
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10\text{ V}$	2.3
$Q_g$ (Max.) (nC)	31	
$Q_{gs}$ (nC)	4.6	
$Q_{gd}$ (nC)	17	
Configuration	Single	

**FEATURES**

- Isolated Package
- High Voltage Isolation = 2.5 kV<sub>RMS</sub> (t = 60 s; f = 60 Hz)
- Sink to Lead Creepage Distance = 4.8 mm
- Dynamic dV/dt Rating
- Low Thermal Resistance
- Lead (Pb)-free Available


**RoHS\***  
 COMPLIANT
**ABSOLUTE MAXIMUM RATINGS**  $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			$V_{DS}$	600	V
Gate-Source Voltage			$V_{GS}$	$\pm 20$	
Continuous Drain Current	$V_{GS}$ at 10 V	$T_C = 25\text{ }^{\circ}\text{C}$	$I_D$	2.0	A
		$T_C = 100\text{ }^{\circ}\text{C}$		1.6	
Pulsed Drain Current <sup>a</sup>			$I_{DM}$	10	
Linear Derating Factor				0.28	W/ $^{\circ}\text{C}$
Single Pulse Avalanche Energy <sup>b</sup>			$E_{AS}$	250	mJ
Repetitive Avalanche Current <sup>a</sup>			$I_{AR}$	2.5	A
Repetitive Avalanche Energy <sup>a</sup>			$E_{AR}$	3.5	mJ
Maximum Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$		$P_D$	35	W
Peak Diode Recovery $dV/dt^c$			$dV/dt$	3.0	V/ns
Operating Junction and Storage Temperature Range			$T_J, T_{stg}$	- 55 to + 150	$^{\circ}\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s			300 <sup>d</sup>	
Mounting Torque	6-32 or M3 screw			10	lbf · in
				1.1	N · m

**Notes**


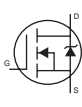
- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$ , starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 73\text{ mH}$ ,  $R_G = 25\text{ }\Omega$ ,  $I_{AS} = 1.5\text{ A}$  (see fig. 12).
- $I_{SD} \leq 1.6\text{ A}$ ,  $dI/dt \leq 60\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{DS}$ ,  $T_J \leq 150\text{ }^\circ\text{C}$ .
- 1.6 mm from case.

\* Pb containing terminations are not RoHS compliant, exemptions may apply

**THERMAL RESISTANCE RATINGS**

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	65	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	3.6	

**SPECIFICATIONS**  $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$		600	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$ , $I_D = 1\text{ mA}$		-	0.62	-	V/ $^\circ\text{C}$
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$		2.0	-	4.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 600\text{ V}$ , $V_{GS} = 0\text{ V}$		-	-	100	$\mu\text{A}$
		$V_{DS} = 480\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$		-	-	500	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 1.5\text{ A}^b$	-	2.3	-	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 50\text{ V}$ , $I_D = 1.5\text{ A}^b$		2.2	-	-	S
Dynamic							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1.0\text{ MHz}$ , see fig. 5		-	660	-	pF
Output Capacitance	$C_{oss}$			-	86	-	
Reverse Transfer Capacitance	$C_{rss}$			-	19	-	
Drain to Sink Capacitance	C	$f = 1.0\text{ MHz}$		-	12	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}$	$I_D = 1.6\text{ A}$ , $V_{DS} = 360\text{ V}$ , see fig. 6 and 13 <sup>b</sup>	-	-	31	nC
Gate-Source Charge	$Q_{gs}$			-	-	4.6	
Gate-Drain Charge	$Q_{gd}$			-	-	17	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300\text{ V}$ , $I_D = 1.6\text{ A}$ , $R_G = 12\text{ }\Omega$ , $R_D = 82\text{ }\Omega$ , see fig. 10 <sup>b</sup>		-	11	-	ns
Rise Time	$t_r$			-	13	-	
Turn-Off Delay Time	$t_{d(off)}$			-	35	-	
Fall Time	$t_f$			-	14	-	
Internal Drain Inductance	$L_D$	Between lead, 6 mm (0.25") from package and center of die contact 		-	4.5	-	nH
Internal Source Inductance	$L_S$			-	7.5	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	2.0	A
Pulsed Diode Forward Current <sup>a</sup>	$I_{SM}$			-	-	10	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_S = 1.5\text{ A}$ , $V_{GS} = 0\text{ V}^b$		-	-	1.6	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = 1.6\text{ A}$ , $dI/dt = 100\text{ A}/\mu\text{s}^b$		-	400	810	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			-	2.1	4.2	$\mu\text{C}$
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$ and $L_D$ )					

**Notes**

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).  
 b. Pulse width  $\leq 300\text{ }\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

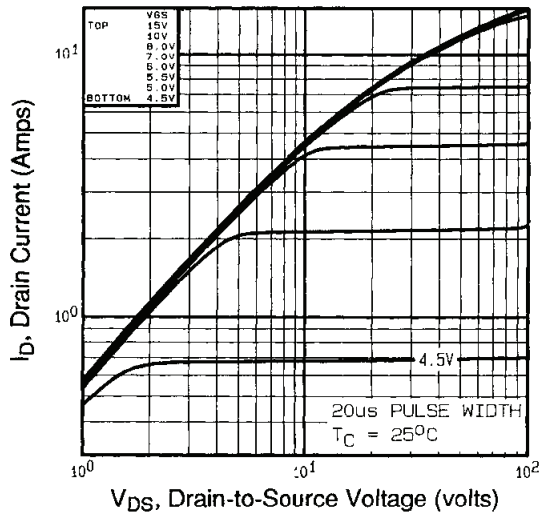
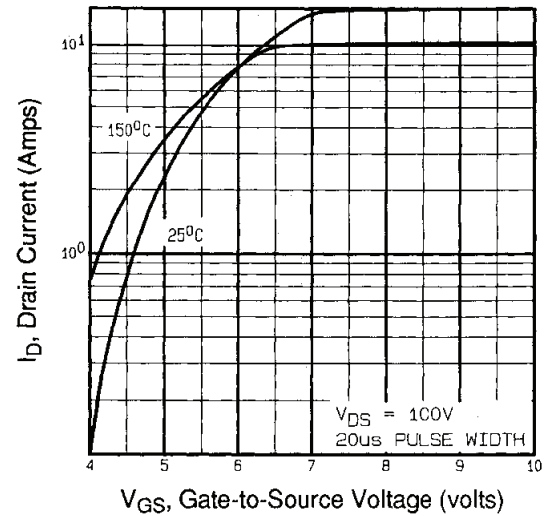
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted
Fig. 1 - Typical Output Characteristics,  $T_C = 25^\circ\text{C}$ 

Fig. 3 - Typical Transfer Characteristics

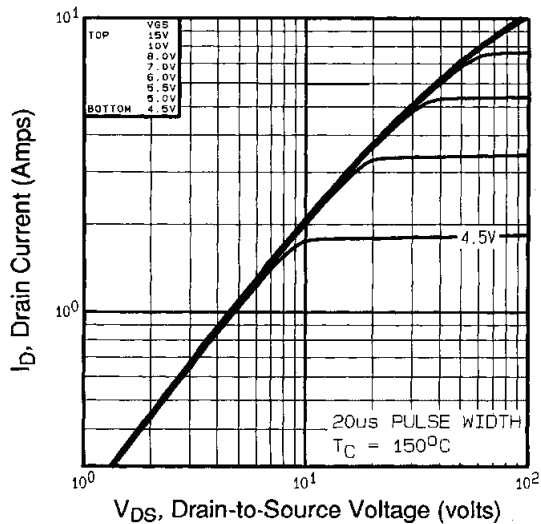
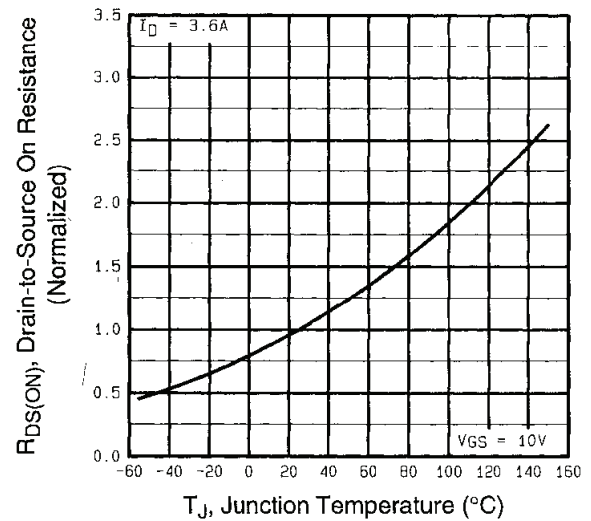
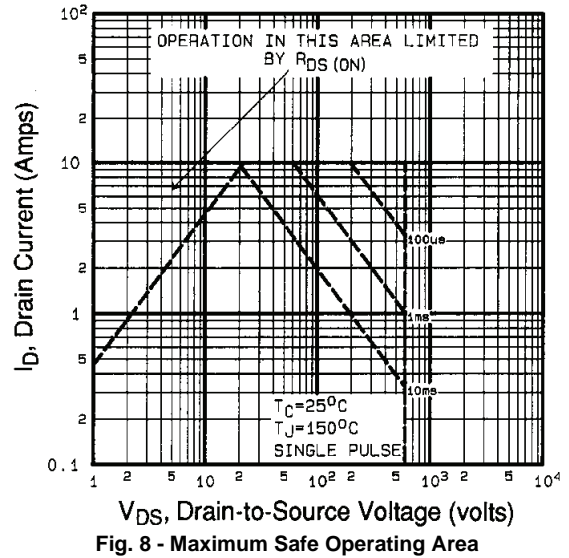
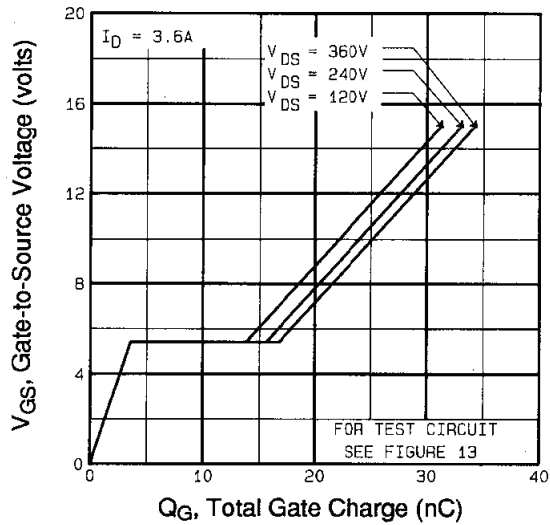
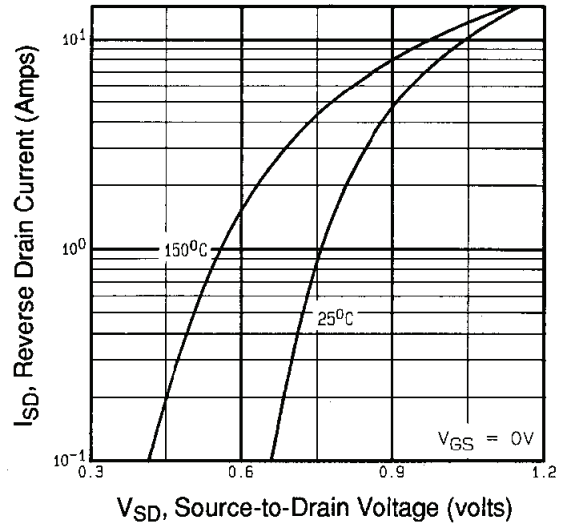
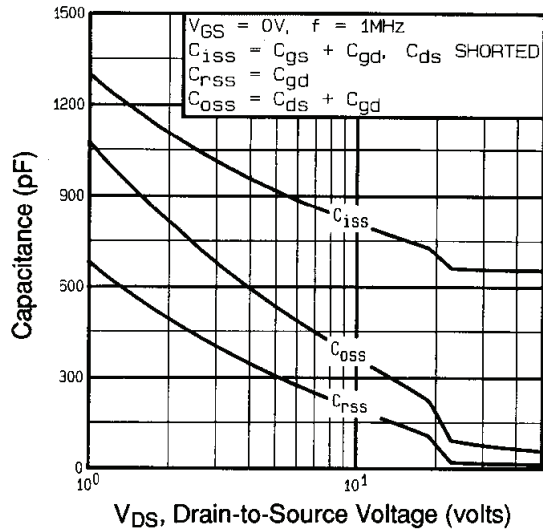
Fig. 2 - Typical Output Characteristics,  $T_C = 150^\circ\text{C}$ 

Fig. 4 - Normalized On-Resistance vs. Temperature



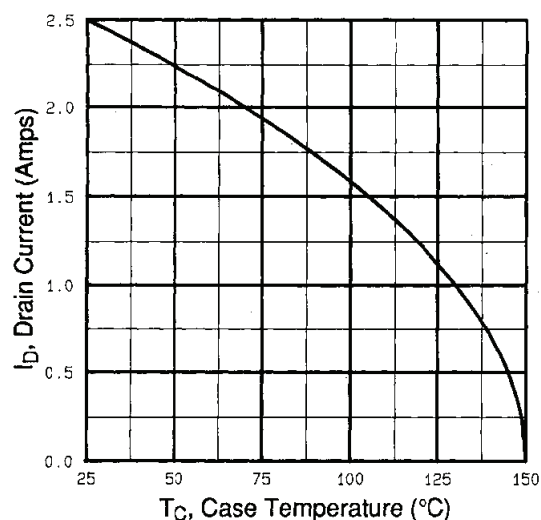


Fig. 9 - Maximum Drain Current vs. Case Temperature

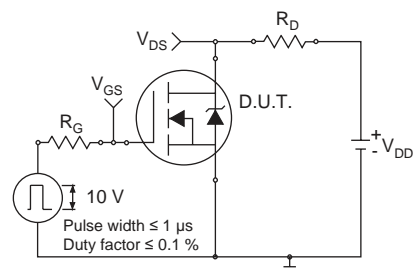


Fig. 10a - Switching Time Test Circuit

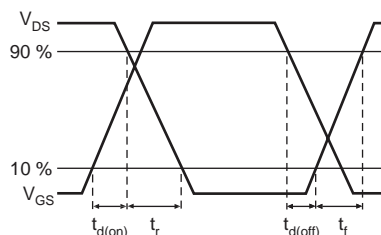


Fig. 10b - Switching Time Waveforms

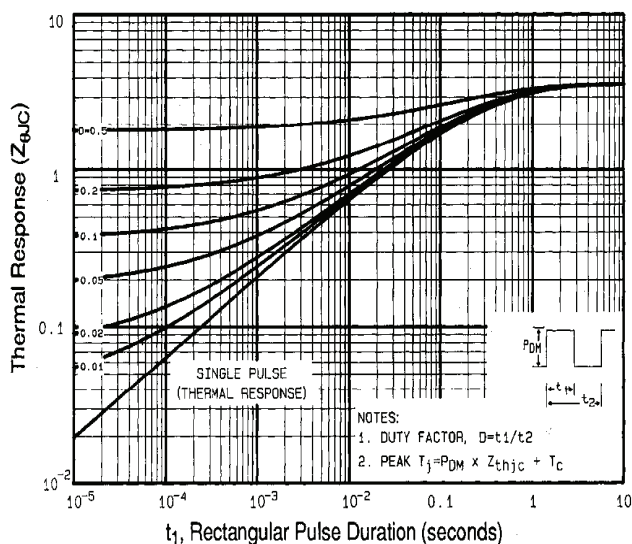


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

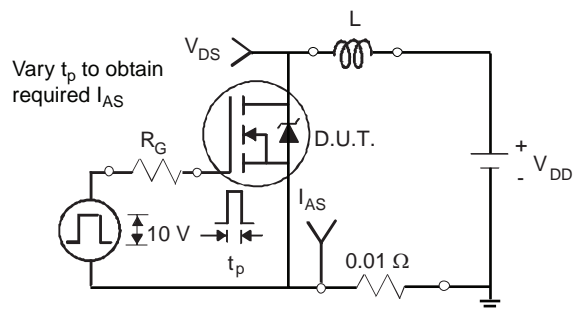


Fig. 12a - Unclamped Inductive Test Circuit

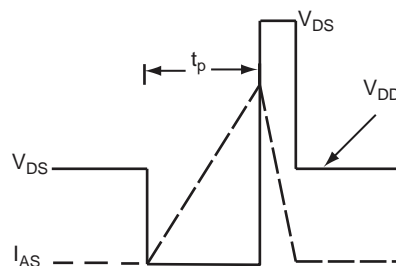


Fig. 12b - Unclamped Inductive Waveforms

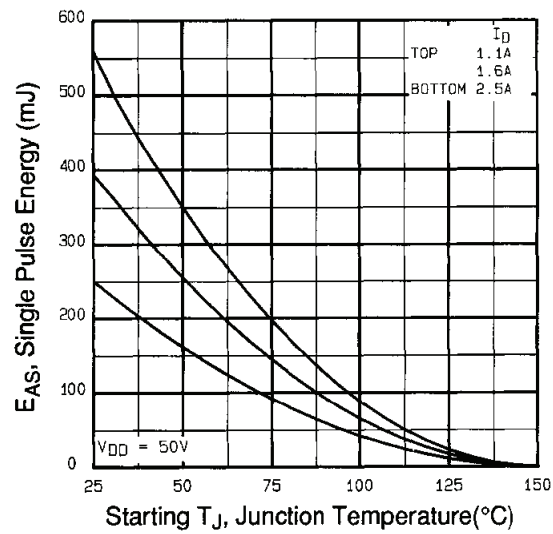


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

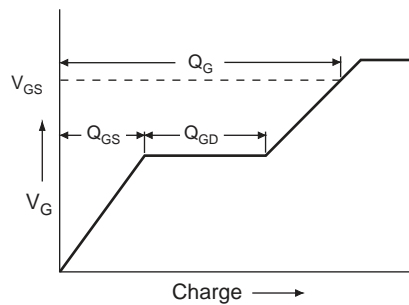


Fig. 13a - Basic Gate Charge Waveform

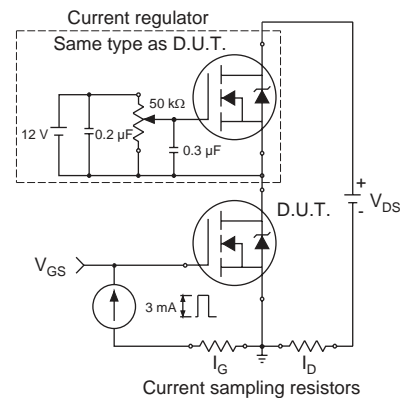
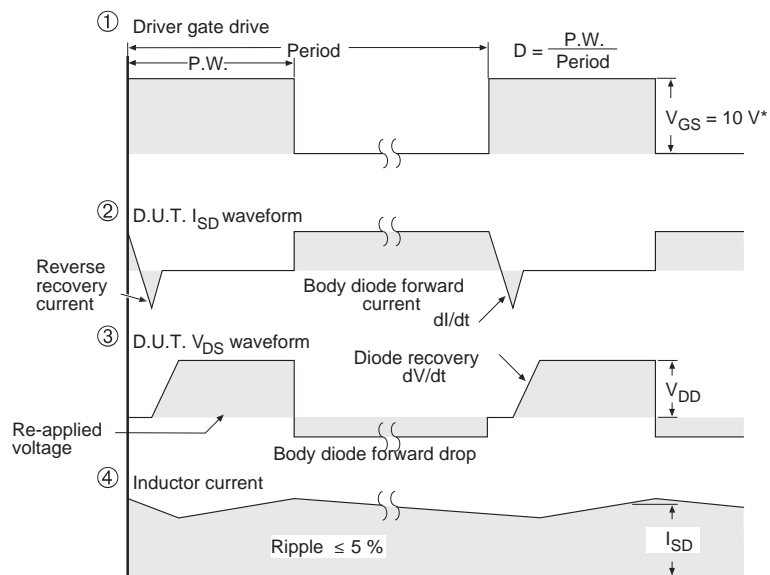
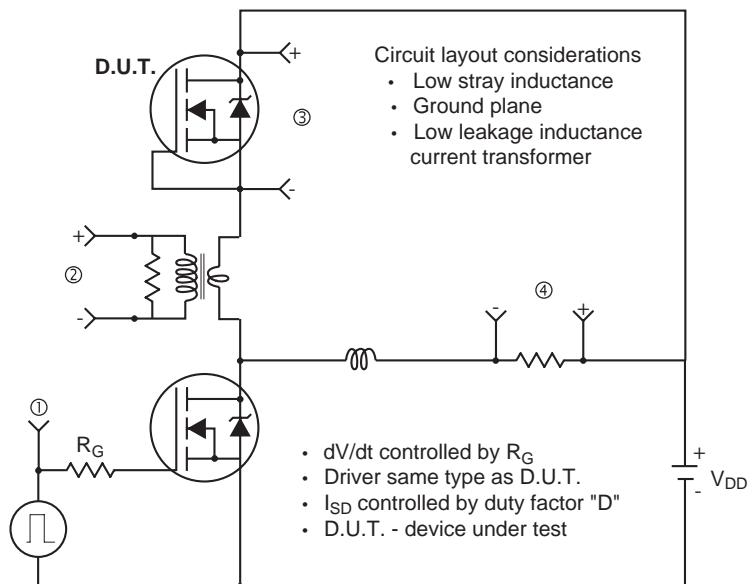


Fig. 13b - Gate Charge Test Circuit

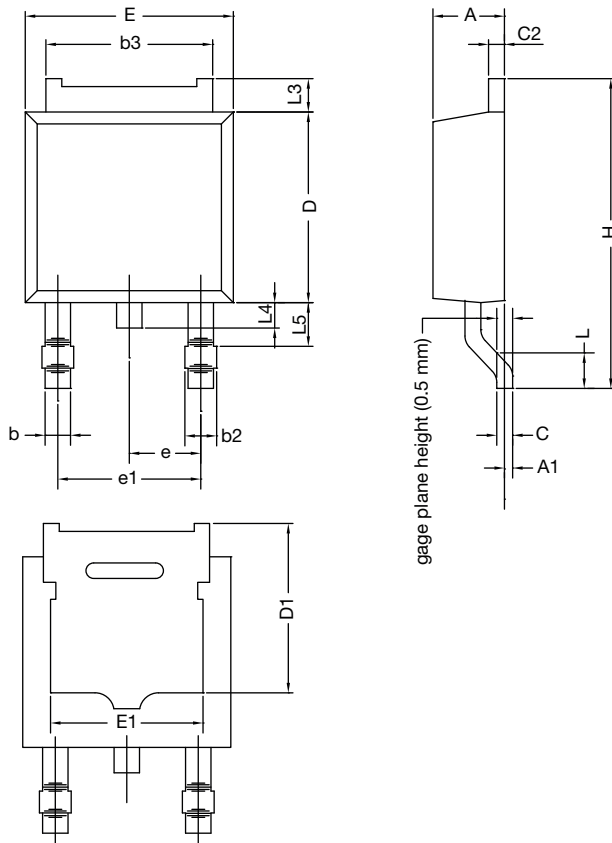
### Peak Diode Recovery $dV/dt$ Test Circuit



\*  $V_{GS} = 5 V$  for logic level devices and  $3 V$  drive devices

**Fig. 14 - For N-Channel**

## TO-252AA CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060
ECN: X12-0247-Rev. M, 24-Dec-12				
DWG: 5347				

### Note

- Dimension L3 is for reference only.



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