

# Errata to IEEE Standard Test Specification for Thyristor Diode Surge Protective Devices

Sponsor

**Surge Protective Devices Committee**

of the

**IEEE Power & Energy Society**

*Correction Sheet*

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## **Correction Sheet to IEEE Std C62.37-1996**

**Page 1, Subclause 1.1 Scope, first sentence should read as follows:**

This standard applies to two or three terminal, four or five layer, thyristor surge protective devices (SPDs) for application on systems with voltages equal to or less than 1000 V rms or 1200 V dc.

**Page 2, Subclause 2.2 Definitions, second sentence should read as follows:**

If the volt-ampere characteristics are asymmetrical, then the parameters shall be defined for each polarity.

**Page 2, Subclause 2.2.5, non-repetitive peak pulse current ( $I_{PPS}$ ), sentence should read as follows:**

Rated maximum value of peak impulse current of specified amplitude and waveshape that may be applied.

**Page 3, Subclause 2.3.7, impulse reset time, title should read**

impulse reset time ( $t_{RESET}$ )

**Page 4, Subclause 2.3.11, peak pulse impulse current ( $I_{PPM}$ ), sentence should read as follows:**

Rated maximum value of peak impulse pulse current ( $I_{PP}$ ) applied for 10 pulses with 10/1000 waveshape and maximum duty factor of 0.01% without causing failure.

**Page 5, Subclause 2.5, Gated thyristor surge protection device (SPD), title should read as follows:**

Gated thyristor surge protective device (SPD)

**Page 5, Subclause 2.5.2, gate reverse current, main terminals short-circuited ( $I_{GAS}$ ;  $I_{GKS}$ ), text after sentence should read as follows:**

(See 4.5.21)

**Page 10, section 4.4.4, Non-repetitive peak pulse current—  $I_{PPS}$ , last paragraph, last sentence should read as follows:**

Table 1 shows some wave shapes commonly used to test thyristor SPDs for telecommunication applications.

**Page 11, Subclause 4.1, Standard design test criteria, first sentence should read as follows:**

The design tests described in 4.4.1 through 4.5.26 provide standardized methods for making single observations of a specified property of a thyristor SPD.

**Page 12, Subclause 4.3, Thyristor surge protection device (SPD) test conditions, title should read as follows:**

Thyristor surge protective device (SPD) test conditions

**Page 12, Subclause 4.3, Thyristor surge protection device (SPD) test conditions, sixth sentence should read as follows:**

Normally this would be done by clipping ferrite cores onto the probe cables.

**Page 18, Subclause 4.4.8, Critical rate of rise of on-state current—  $di/dt$ , first sentence should read as follows:**

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The purpose of this test is to verify that a thyristor SPD can survive a fast rising current, as may occur on the wavefront of an impulse.

**Page 20, Subclause 4.5.4, Breakover voltage—  $V_{(BO)}$  and current—  $I_{(BO)}$ ,**

The test generator shall be specified for the open-circuit voltage and short-circuit current waveforms (or equivalents of rate-of-rise, wave shape and wave shape peak value) and, for ac testing, the duration.

**Page 23, Subclause 4.5.3, Figures 17, 18 and 19 should be as follows:**

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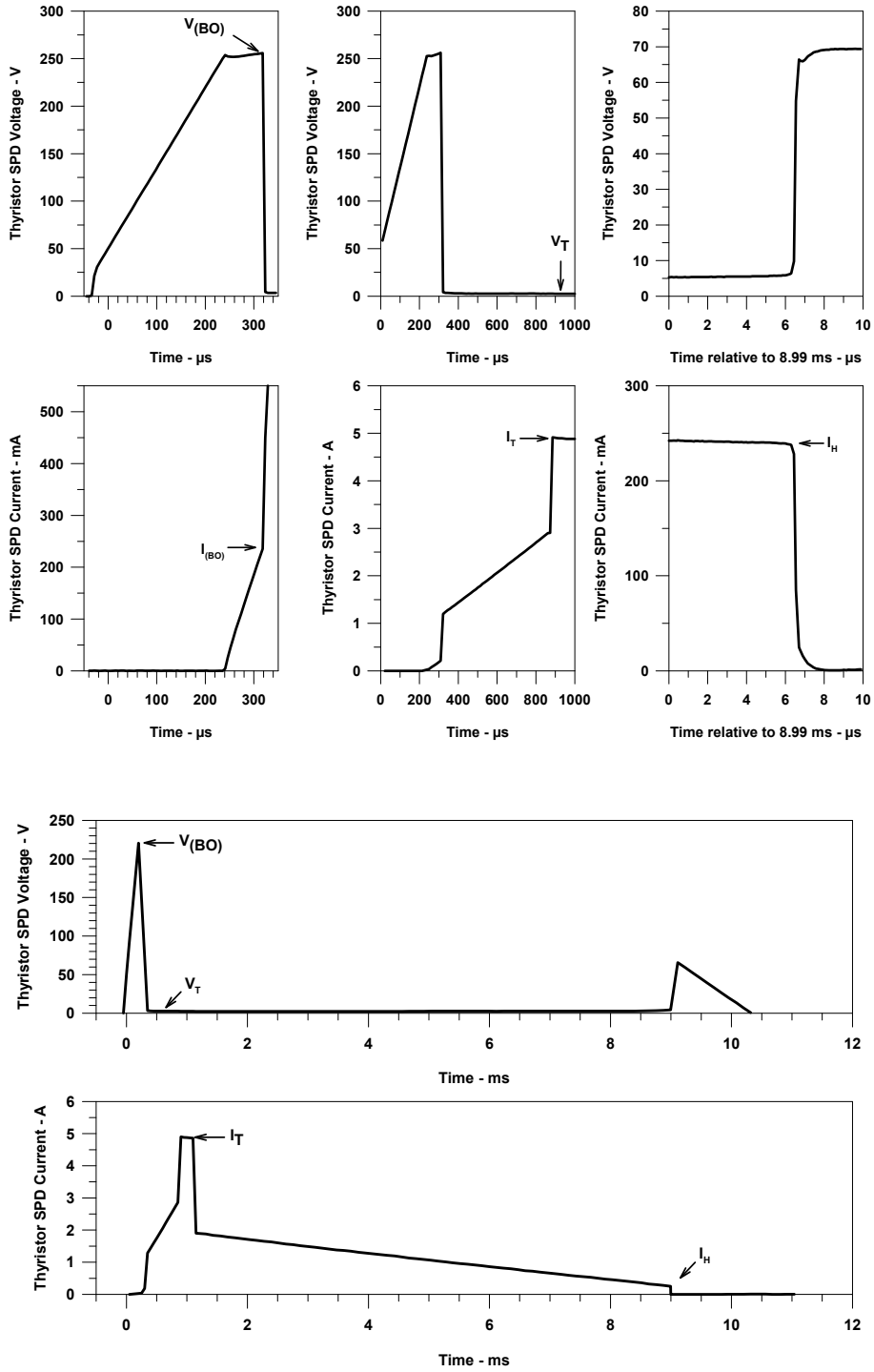


Figure 17—Switching and on-state waveforms for a positive breakdown slope thyristor SPD

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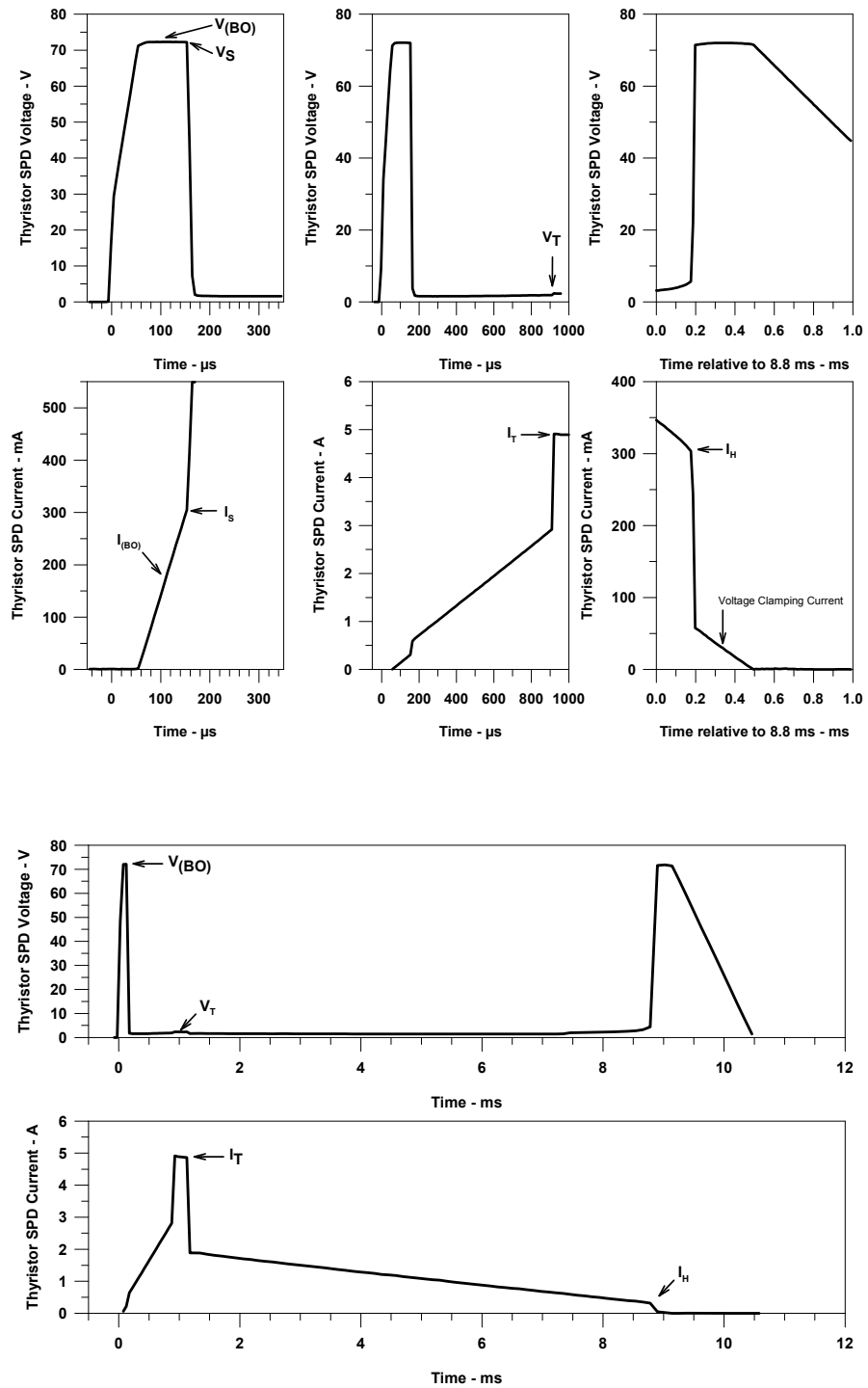


Figure 18—Switching and on-state waveforms of a gated thyristor SPD

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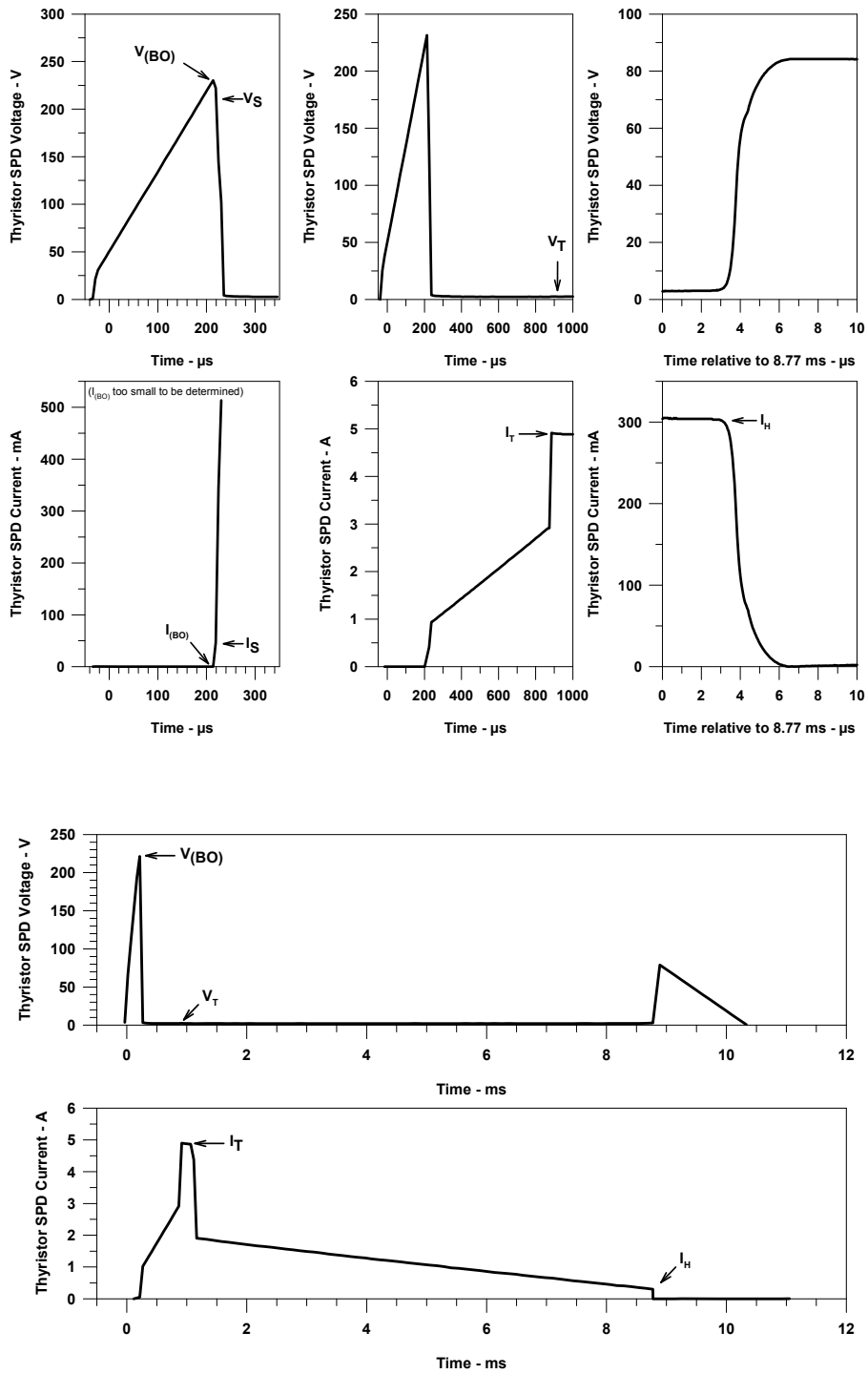


Figure 19—Switching and on-state waveforms for a negative breakdown slope thyristor SPD

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**Page 25, Subclause 4.5.6, Holding current—  $I_H$ , third sentence should read as follows:**

The test generator shall be specified for the open circuit voltage and short-circuit current values, or equivalents, of wave shape and wave shape peak value

**Page 25, Subclause 4.5.6, Holding current—  $I_H$ , second to last sentence should read as follows:**

To increase the switch off voltage level, the generator and a current (< minimum specified value of  $I_H$ ) from a dc voltage supply (< $V_{DRM}$ ) should be diode ORed onto the DUT (see Figure 21).

**Page 26, Subclause 4.5.6, Holding current—  $I_H$ , Figure 21 title should read as follows:**

Figure 21—Test circuit for holding current ( $I_H$ ) with additional dc bias (impulse reset)

**Page 28, Subclause 4.5.8, Breakdown voltage—  $V_{(BR)}$ , last sentence of second paragraph should read as follows:**

For a negative breakdown slope thyristor SPD (see Figures 4, 5, and 6) this measurement approach can be used to determine  $V_{(BO)}$ .

**Page 29, Subclause 4.5.9, Switching voltage—  $V_S$  and current—  $I_S$ , sixth sentence should read as follows:**

A V-I characteristic can be produced by plotting the recorded current against the recorded voltage.

**Page 30, Subclause 4.5.11, Peak forward recovery voltage—  $V_{FRM}$ , third sentence should read as follows:**

The generator shall switch the diode section on at a specified rate of forward current rise,  $dI_F/dt$ , and the value of peak forward recovery voltage,  $V_{FRM}$ , shall be measured (see Figure 25).

**Page 32, Subclause 4.5.14, Temperature coefficient of breakdown voltage, title should read as follows:**

Temperature coefficient of breakdown voltage—  $\alpha_{V(BR)}$

**Page 33, Subclause 4.5.17, Thermal resistance—  $R_\theta$ , Third equation should read as follows:**

$$R_{\theta JL} = (T_{JPK} - T_L) / P_{TOT} \text{ } ^\circ\text{C/W}$$

**Page 34, Subclause 4.5.17, Thermal resistance—  $R_\theta$ , Figure 28 title should read as follows:**

Figure 28—Test circuit for thermal resistance ( $R_\theta$ ) and impedance ( $Z_\theta$ )

**Page 35, Subclause 4.5.18, Transient thermal impedance—  $Z_{\theta(t)}$ , Figure 29 should be as follows:**

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THERMAL RESPONSE

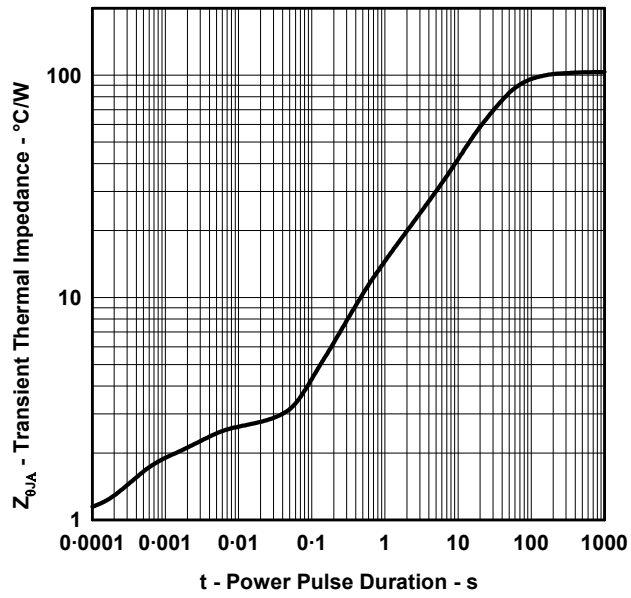
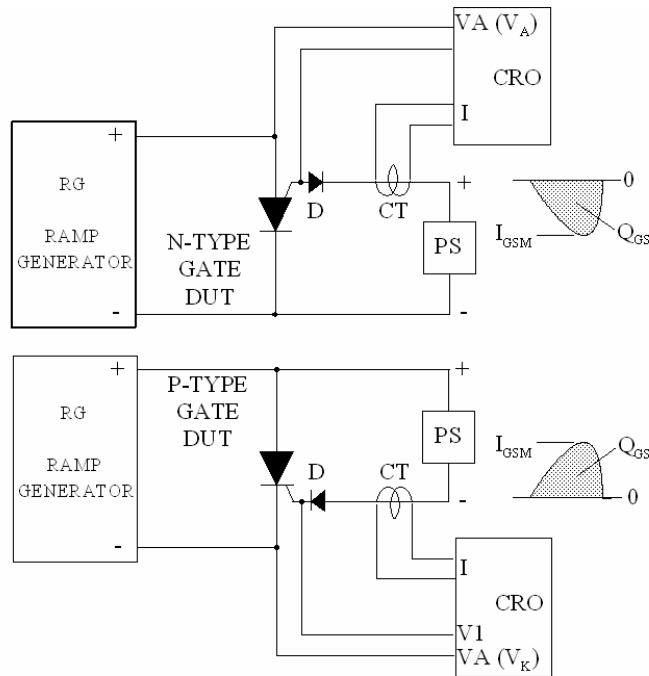


Figure 29—Thermal impedance ( $Z_{\theta JA}$ ) vs. time

Page 40, Subclause 4.5.24, Gate switching charge— $Q_{GS}$ , Figure 35 should be as follows:



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- DUT = Device Under Test
- VA = Adjacent terminal voltage
- V1 = Monitored gate voltage
- D = Series gate diode
- RG = Ramp generator with specified di/dt and dv/dt characteristics
- PS = DC power supply, set at specified gate voltage,  $V_{GG}$
- CT = Current transformer or equivalent
- CRO = Dual channel oscilloscope or equivalent

Figure 35—Test circuit for gate switching current, gate switching charge, and gate-to adjacent terminal breakover voltage ( $I_{GSM}$ ,  $Q_{GS}$ ,  $V_{GK(BO)}$ ,  $V_{GA(BO)}$ )

**Page 40, Figure 35, last listed item should read as follows:**

CRO = Dual channel oscilloscope or equivalent

**Page 41, Figure 36, last listed item should read as follows:**

CRO = Dual channel oscilloscope or equivalent

**Page 42, Subclause 4.5.24, Gate switching charge— $Q_{GS}$ , Figure 37 should be as follows:**

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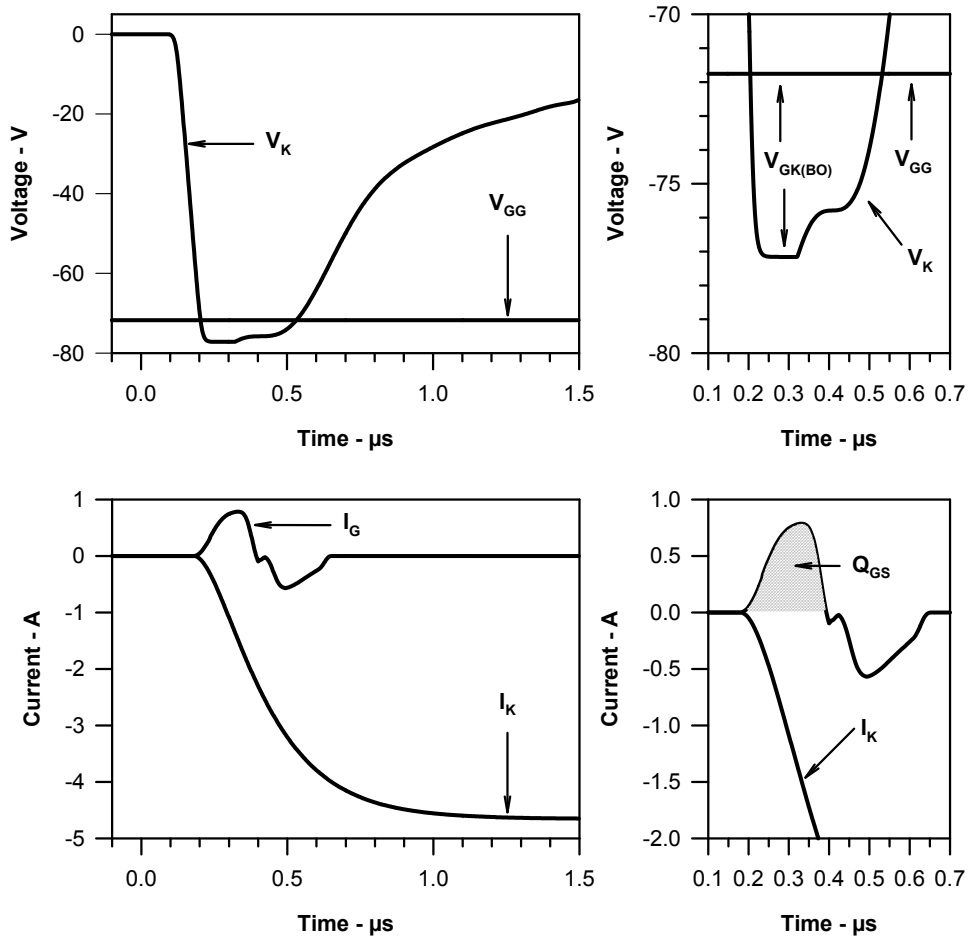


Figure 37—Overall and expanded clamping waveforms for a p-type gate DUT to illustrate  $V_{GK(BO)}$  and  $Q_{GS}$  measurement ( $di_K/dt=10 \text{ A}/\mu\text{s}$ )

**Page 47, Subclause A.1.31, quadrant, second sentence should read as follows:**

These quadrants are numbered counterclockwise as 1 through 4.

**Page 48, Subclause A.1.41, unidirectional thyristor surge protection device (SPD), title should read as follows:**

unidirectional thyristor surge protective device (SPD):

**Page 41, Figure 36, last listed item should read as follows:**

CRO = Dual channel oscilloscope or equivalent

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