

# μ PA1932TE

## MOS FIELD EFFECT TRANSISTOR

R07DS0001EJ0100  
Rev.1.00  
May 31, 2010

### Description

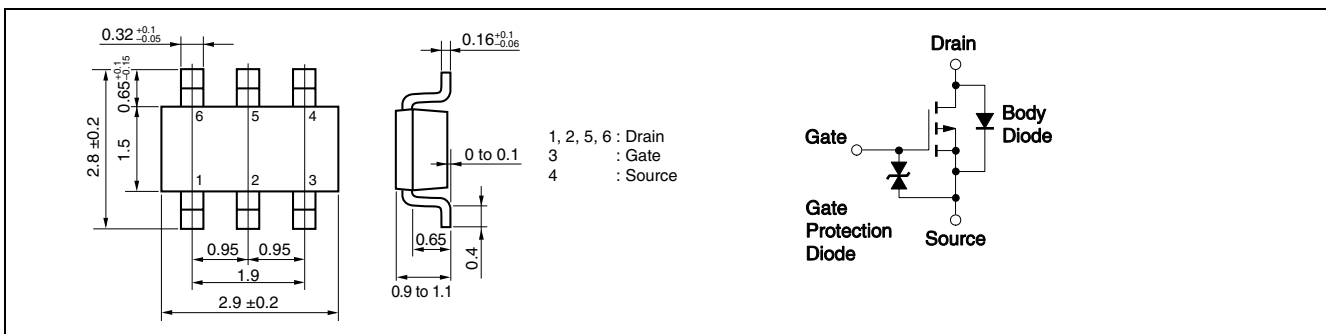
The μ PA1932TE is a switching device, which can be driven directly by a 4.5 V power source. The μ PA1932TE features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of portable machine and so on.

### Features

- $V_{DS}$  Maximum ratings -30 V ( $T_A = 25^\circ\text{C}$ )
- 4.5 V drive available
- Low on-state resistance
  - $R_{DS(on)1} = 38 \text{ m}\Omega \text{ MAX.}$  ( $V_{GS} = -10 \text{ V}, I_D = -3.0 \text{ A}$ )
  - $R_{DS(on)2} = 59 \text{ m}\Omega \text{ MAX.}$  ( $V_{GS} = -4.5 \text{ V}, I_D = -3.0 \text{ A}$ )

### Package Drawing (Unit: mm)

### Equivalent Circuit



### Ordering Information

Part No.	Package
μ PA1932TE-T1-AT <sup>Note</sup>	SC-95 (Mini Mold Thin Type)
μ PA1932TE-T2-AT <sup>Note</sup>	

Note: This product does not contain Pb in external electrode and other parts.  
"-T1", "-T2" indicates the unit orientation (8 mm embossed carrier tape, 3,000 p/reel).

Marking: UD

### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ )

Item	Symbol	Ratings	Unit
Drain to Source Voltage ( $V_{GS} = 0 \text{ V}$ )	$V_{DSS}$	-30	V
Gate to Source Voltage ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	±20	V
Drain Current (DC)	$I_{D(DC)}$	±6.0	A
Drain Current (pulse) <sup>Note1</sup>	$I_{D(pulse)}$	±24	A
Total Power Dissipation	$P_{T1}$	0.2	W
Total Power Dissipation <sup>Note2</sup>	$P_{T2}$	2.0	W
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature	$T_{stg}$	-55 to + 150	°C
Single Avalanche Current <sup>Note3</sup>	$I_{AS}$	6.0	A
Single Avalanche Energy <sup>Note3</sup>	$E_{AS}$	3.6	mJ

Notes 1.  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1\%$   
2. Mounted on a glass epoxy board of  $2500 \text{ mm}^2 \times 1.6 \text{ mm}$ ,  $t \leq 5 \text{ sec}$   
3. Starting  $T_{ch} = 25^\circ\text{C}$ ,  $V_{DD} = -15 \text{ V}$ ,  $R_G = 25 \Omega$ ,  $L = 100 \mu\text{H}$ ,  $V_{GS} = -20 \rightarrow 0 \text{ V}$

Remark The diode connected between the gate and source of the transistor serves as a protector against ESD.  
 When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

**Caution for Electrostatic Discharge**

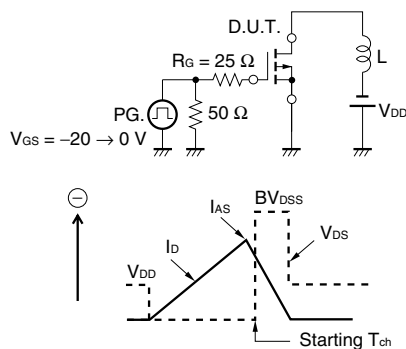
This product is electrostatic-sensitive device due to low ESD capability and should be handled with caution for electrostatic discharge.  $V_{ESD} \pm 200$  V TYP. (C = 200 pF, R = 0 Ω, Single pulse)

**Electrical Characteristics (T<sub>A</sub> = 25°C)**

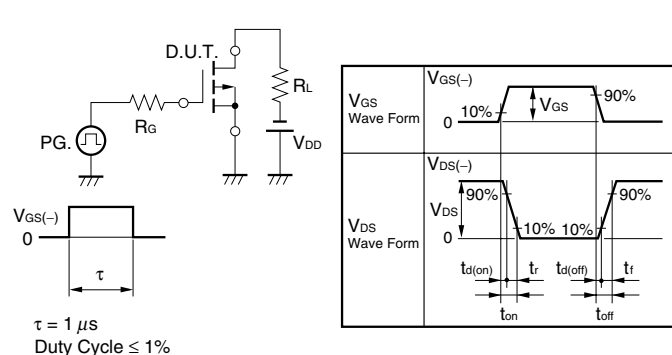
Item	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I <sub>DSS</sub>			-1	μA	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V
Gate Leakage Current	I <sub>GSS</sub>			±10	μA	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	-1.0	-1.6	-2.5	V	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -1.0 mA
Forward Transfer Admittance <sup>Note</sup>	y <sub>fs</sub>	2.5	5.0		S	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -3.0 A
Drain to Source On-state Resistance <sup>Note</sup>	R <sub>DS(on)1</sub>		30	38	mΩ	V <sub>GS</sub> = -10 V, I <sub>D</sub> = -3.0 A
	R <sub>DS(on)2</sub>		36	59	mΩ	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -3.0 A
Input Capacitance	C <sub>iss</sub>		950		pF	V <sub>DS</sub> = -10 V
Output Capacitance	C <sub>oss</sub>		210		pF	V <sub>GS</sub> = 0 V
Reverse Transfer Capacitance	C <sub>rss</sub>		170		pF	f = 1.0 MHz
Turn-on Delay Time	t <sub>d(on)</sub>		11		ns	V <sub>DD</sub> = -15 V, I <sub>D</sub> = -3.0 A, V <sub>GS</sub> = -10 V, R <sub>G</sub> = 6 Ω
Rise Time	t <sub>r</sub>		10		ns	
Turn-off Delay Time	t <sub>d(off)</sub>		73		ns	
Fall Time	t <sub>f</sub>		30		ns	
Total Gate Charge	Q <sub>G</sub>		20		nC	V <sub>DD</sub> = -24 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -6.0 A
Gate to Source Charge	Q <sub>GS</sub>		2		nC	
Gate to Drain Charge	Q <sub>GD</sub>		6		nC	
Body Diode Forward Voltage <sup>Note</sup>	V <sub>F(S-D)</sub>		0.9		V	I <sub>F</sub> = -6.0 A, V <sub>GS</sub> = 0 V
Reverse Recovery Time	t <sub>rr</sub>		36		ns	I <sub>F</sub> = -6.0 A, V <sub>GS</sub> = 0 V,
Reverse Recovery Charge	Q <sub>rr</sub>		23		nC	di/dt = -100 A/μs

Note: Pulsed

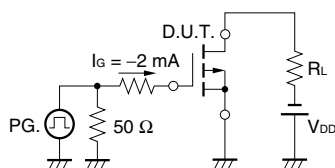
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

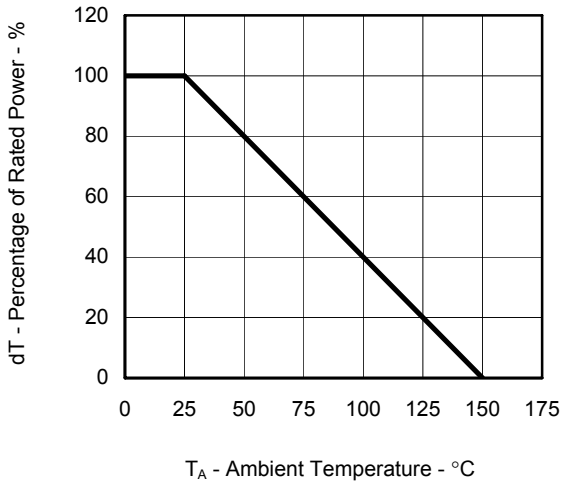


TEST CIRCUIT 3 GATE CHARGE

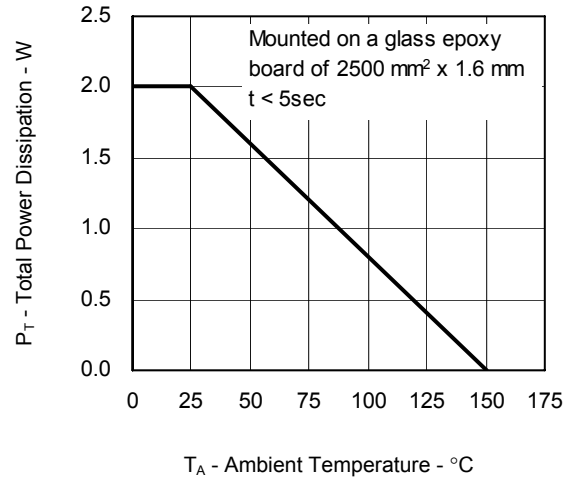


Typical Characteristics (T<sub>A</sub> = 25°C)

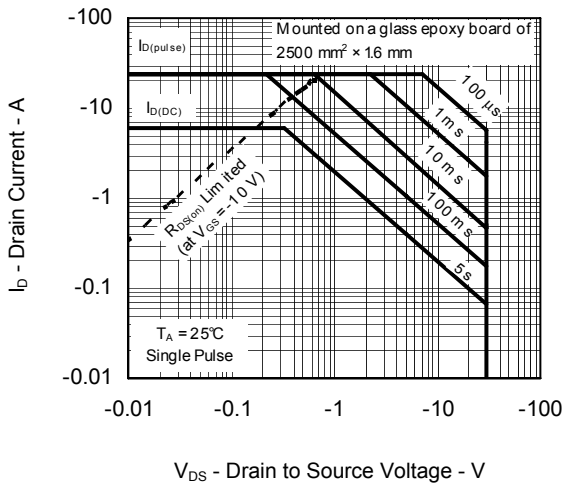
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



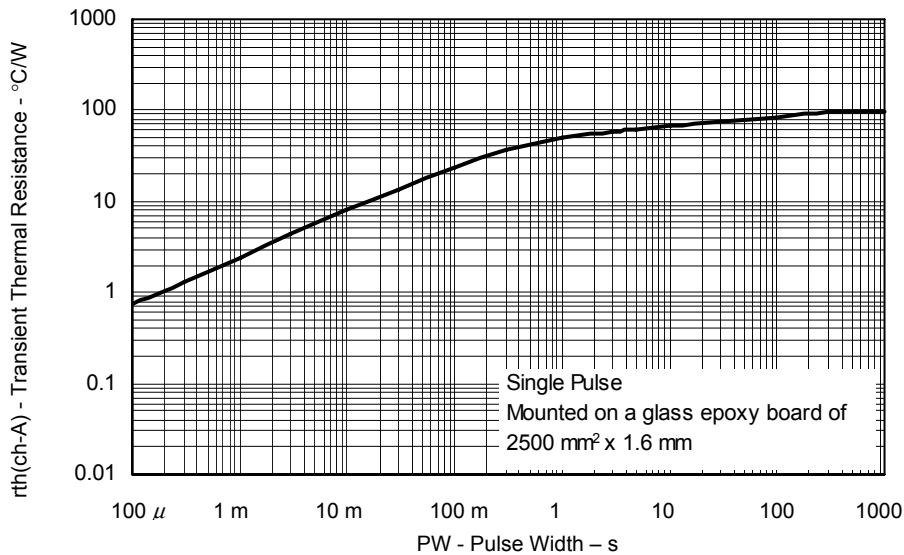
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



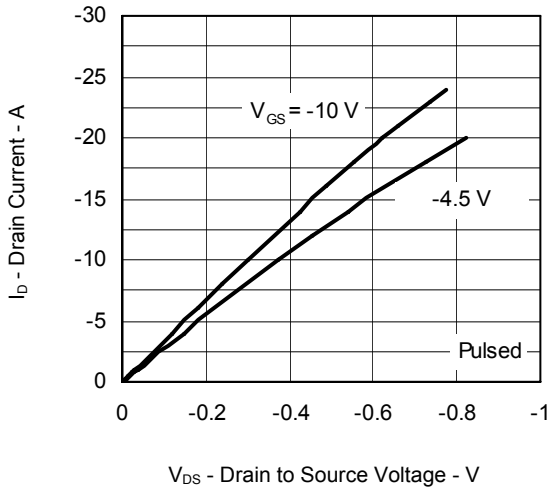
FORWARD BIAS SAFE OPERATING AREA



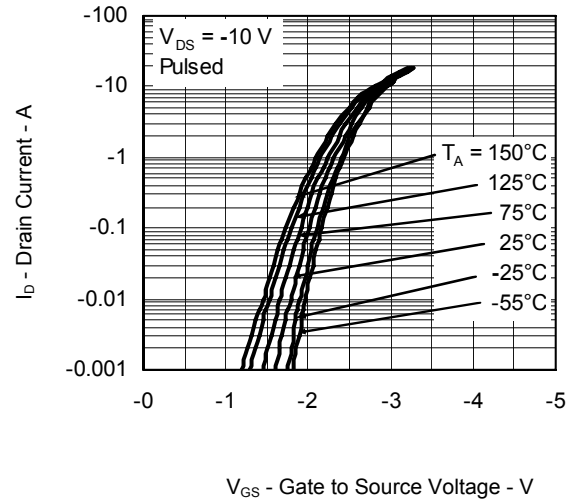
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



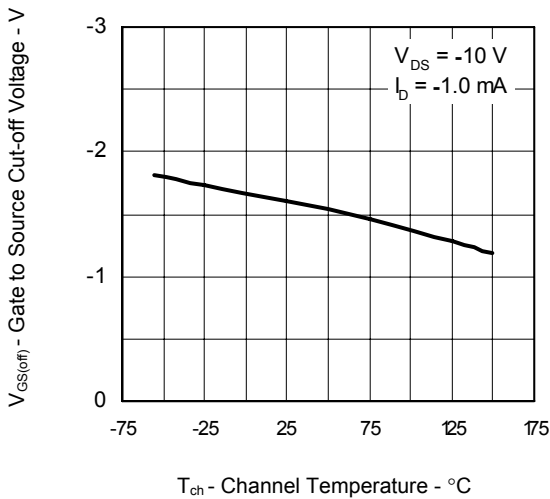
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



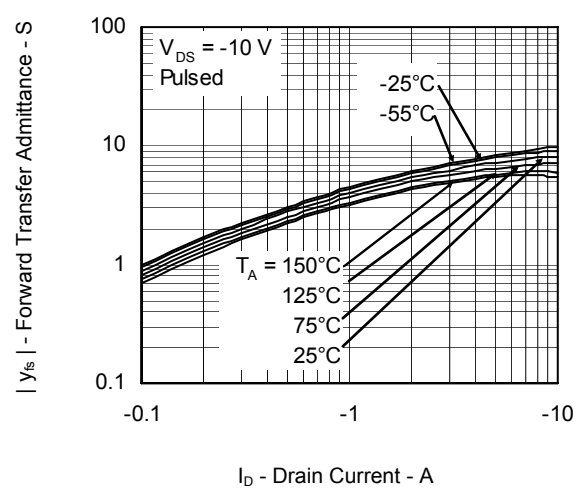
FORWARD TRANSFER CHARACTERISTICS



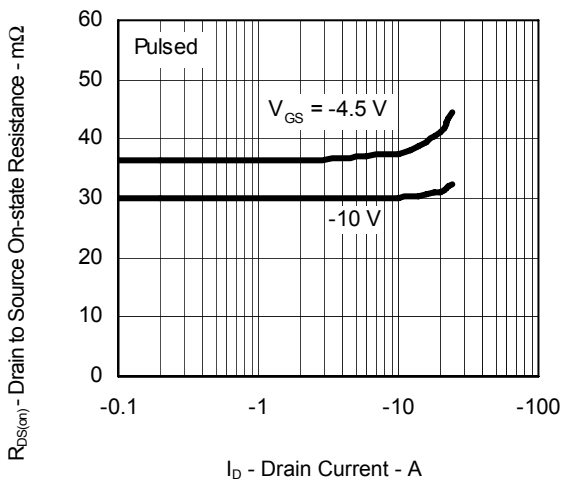
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



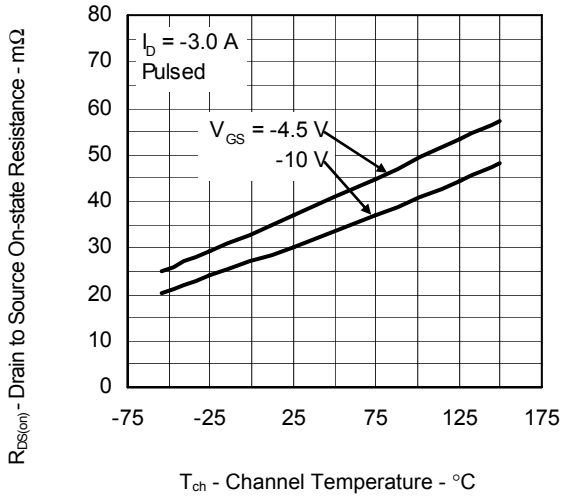
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



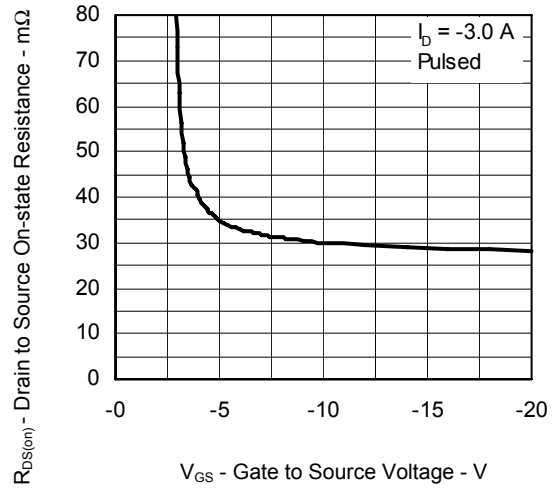
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



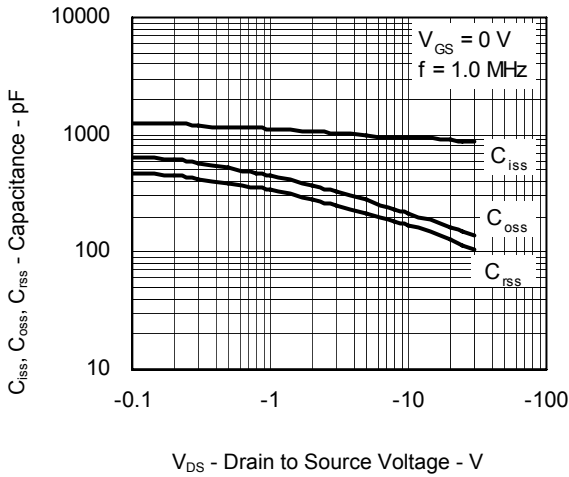
**DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE**



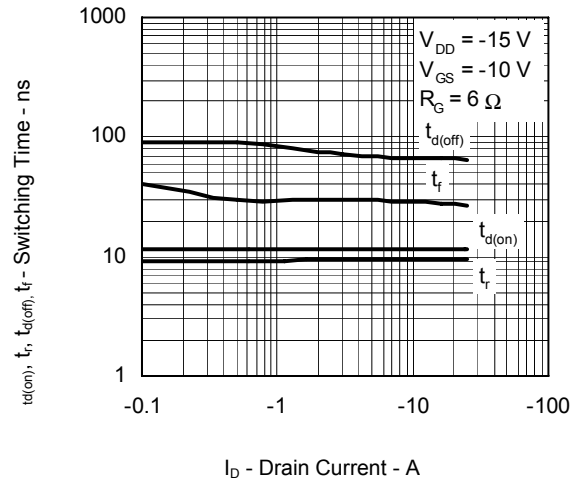
**DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE**



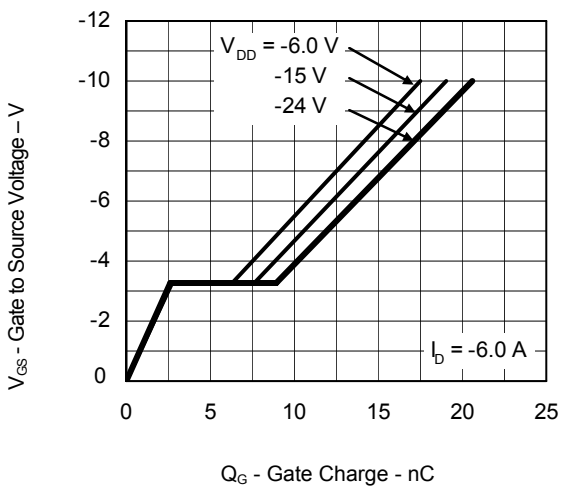
**CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE**



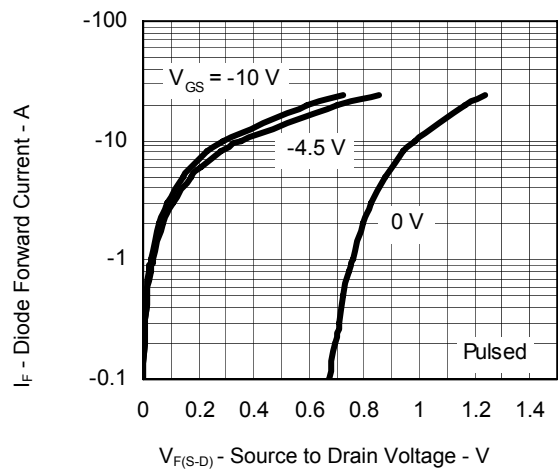
**SWITCHING CHARACTERISTICS**



**DYNAMIC INPUT CHARACTERISTICS**



**SOURCE TO DRAIN DIODE FORWARD VOLTAGE**



<b>Revision History</b>	<i>μ</i> PA1932TE
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Rev.	Date	Description	
		Page	Summary
1.00	May 31, 2010	-	First Edition issued

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