

NP180N055TUK

MOS FIELD EFFECT TRANSISTOR

R07DS0593EJ0100

Rev.1.00

Dec 12, 2011

Description

The NP180N055TUK is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Super low on-state resistance
 $R_{DS(on)} = 1.40 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 90 \text{ A)}$
- Low C_{iss} : $C_{iss} = 10700 \text{ pF TYP. (} V_{DS} = 25 \text{ V)}$
- Designed for automotive application and AEC-Q101 qualified

Ordering Information

Part No.	Lead Plating	Packing		Package
NP180N055TUK-E1-AY *1	Pure Sn (Tin)	Tape 800 p/reel	Taping (E1 type)	TO-263-7pin (MP-25ZT)
NP180N055TUK-E2-AY *1			Taping (E2 type)	

Note: *1 Pb-free (This product does not contain Pb in the external electrode)

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

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	55	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 180	A
Drain Current (pulse) *1	$I_{D(pulse)}$	± 720	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	348	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.8	W
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to 175	$^\circ\text{C}$
Repetitive Avalanche Current *2	I_{AR}	66	A
Repetitive Avalanche Energy *2	E_{AR}	435	mJ

Notes: *1 $T_C = 25^\circ\text{C}$, $P_W \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

*2 $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

Thermal Resistance

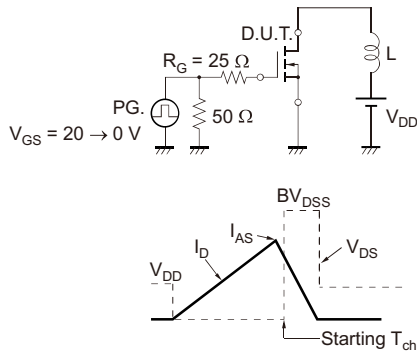
Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.43	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

Electrical Characteristics ($T_A = 25^\circ\text{C}$)

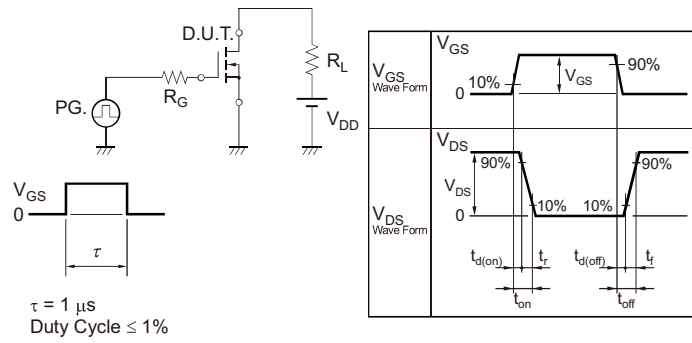
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 55\text{ V}, V_{GS} = 0\text{ V}$
Gate Leakage Current	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$
Gate to Source Threshold Voltage	$V_{GS(th)}$	2.0	3.0	4.0	V	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$
Forward Transfer Admittance *1	$ y_{fs} $	75	150	—	S	$V_{DS} = 5\text{ V}, I_D = 90\text{ A}$
Drain to Source On-state Resistance *1	$R_{DS(on)}$	—	1.15	1.40	m Ω	$V_{GS} = 10\text{ V}, I_D = 90\text{ A}$
Input Capacitance	C_{iss}	—	10700	16050	pF	$V_{DS} = 25\text{ V}$
Output Capacitance	C_{oss}	—	1200	1800	pF	$V_{GS} = 0\text{ V}$
Reverse Transfer Capacitance	C_{rss}	—	380	690	pF	$f = 1\text{ MHz}$
Turn-on Delay Time	$t_{d(on)}$	—	38	90	ns	$V_{DD} = 28\text{ V}, I_D = 90\text{ A}$
Rise Time	t_r	—	20	50	ns	$V_{GS} = 10\text{ V}$
Turn-off Delay Time	$t_{d(off)}$	—	140	280	ns	$R_G = 0\ \Omega$
Fall Time	t_f	—	14	40	ns	
Total Gate Charge	Q_G	—	196	294	nC	$V_{DD} = 44\text{ V}$
Gate to Source Charge	Q_{GS}	—	51	—	nC	$V_{GS} = 10\text{ V}$
Gate to Drain Charge	Q_{GD}	—	45	—	nC	$I_D = 180\text{ A}$
Body Diode Forward Voltage *1	$V_{F(S-D)}$	—	0.9	1.5	V	$I_F = 180\text{ A}, V_{GS} = 0\text{ V}$
Reverse Recovery Time	t_{rr}	—	83	—	ns	$I_F = 180\text{ A}, V_{GS} = 0\text{ V}$
Reverse Recovery Charge	Q_{rr}	—	145	—	nC	$di/dt = 100\text{ A}/\mu\text{s}$

Note: *1 Pulsed test

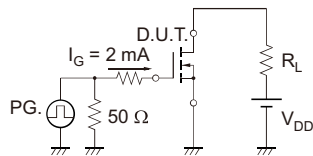
TEST CIRCUIT 1 AVALANCHE CAPABILITY



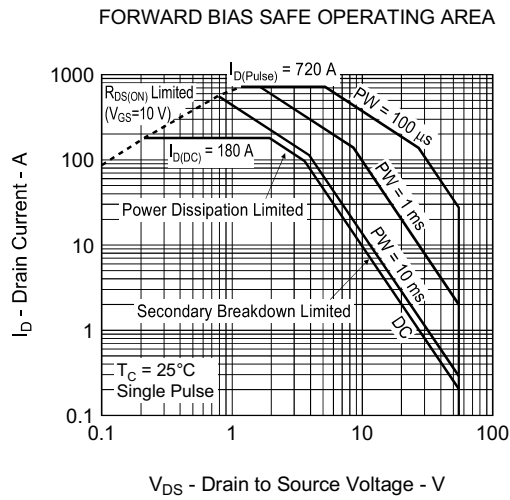
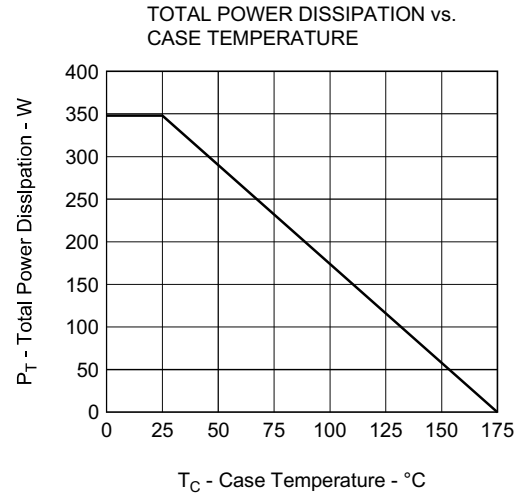
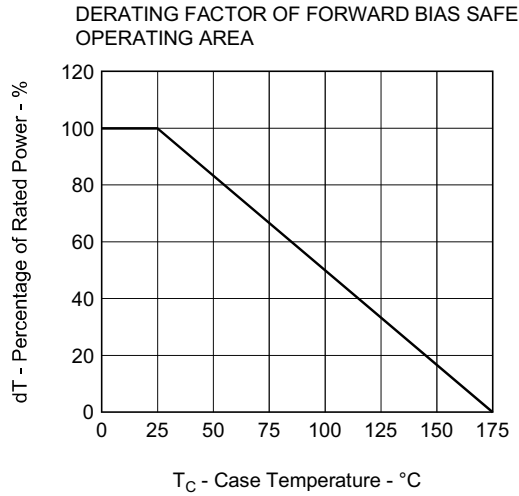
TEST CIRCUIT 2 SWITCHING TIME



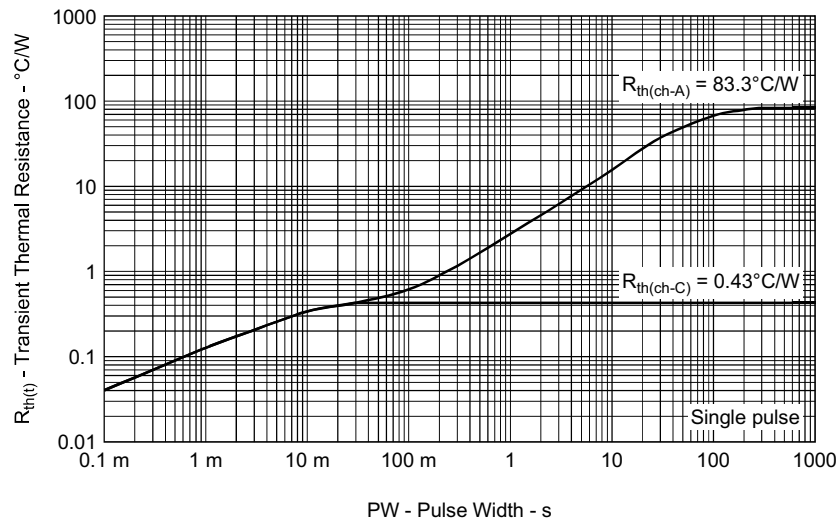
TEST CIRCUIT 3 GATE CHARGE



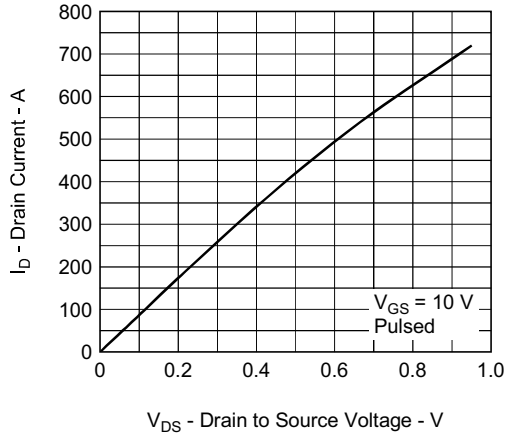
Typical Characteristics ($T_A = 25^\circ\text{C}$)



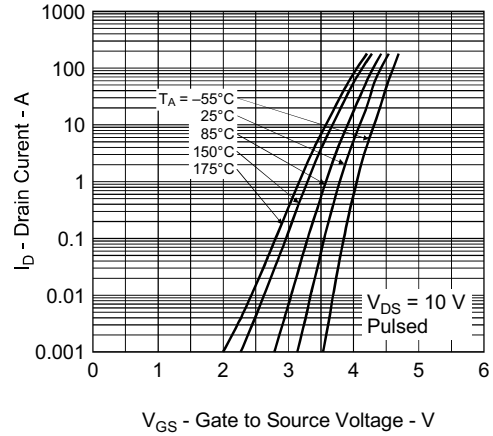
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



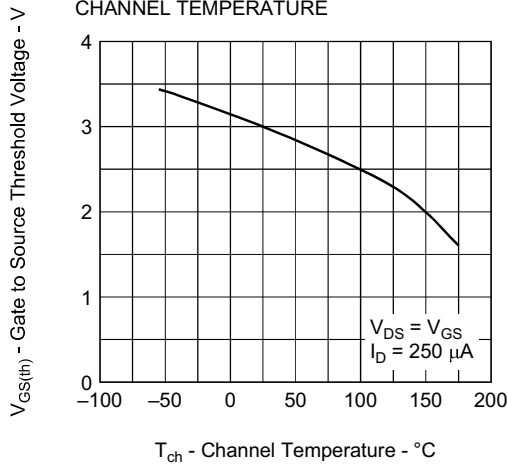
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



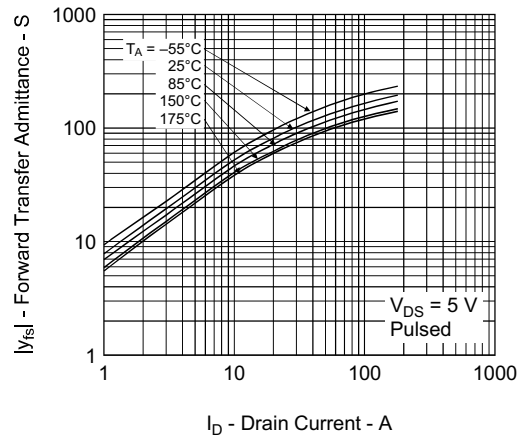
FORWARD TRANSFER CHARACTERISTICS



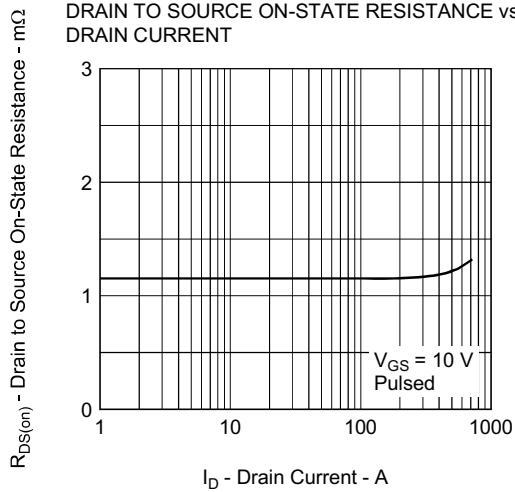
GATE TO SOURCE THRESHOLD VOLTAGE vs.
CHANNEL TEMPERATURE



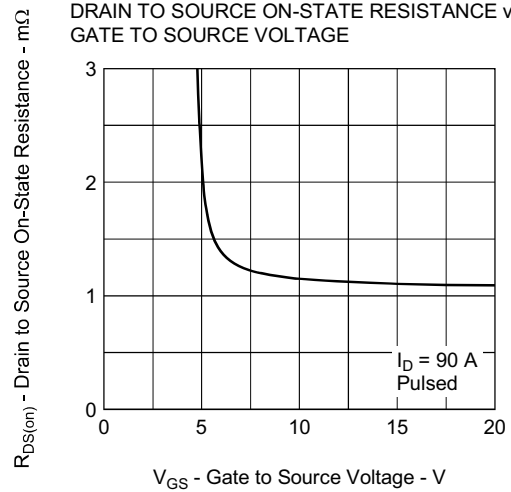
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



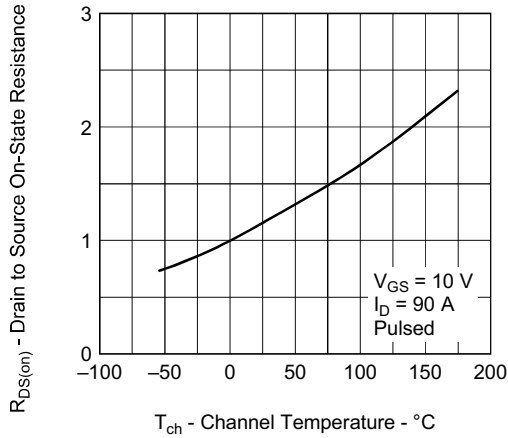
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



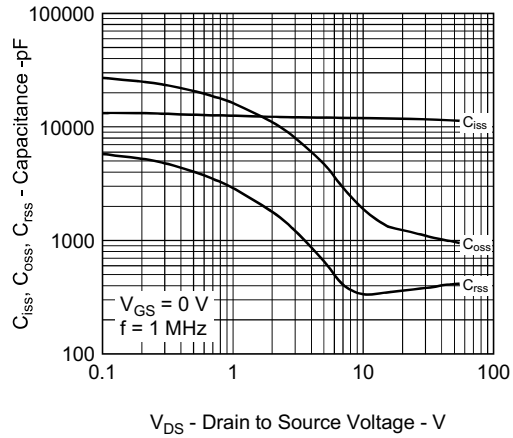
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



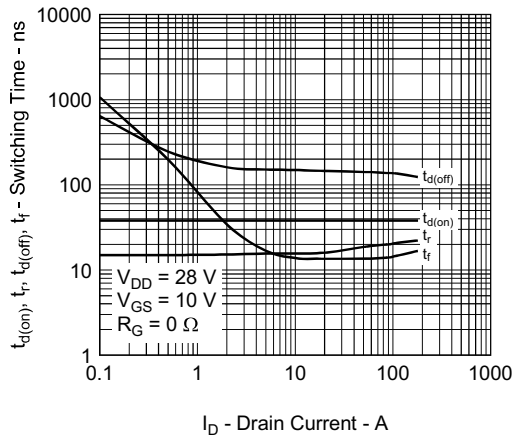
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



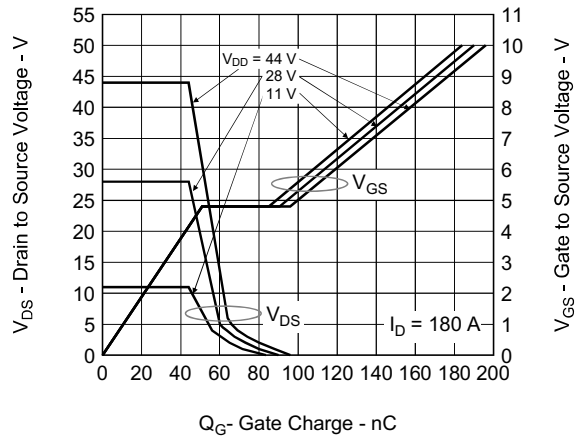
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



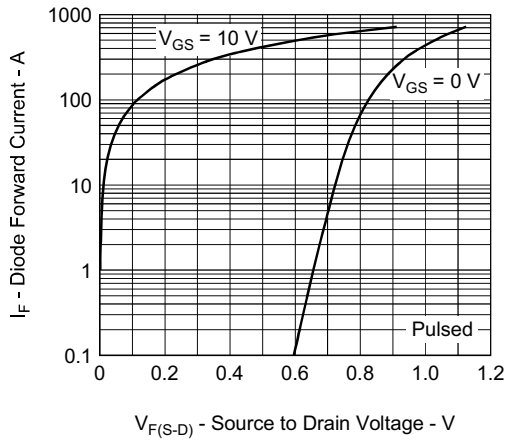
SWITCHING CHARACTERISTICS



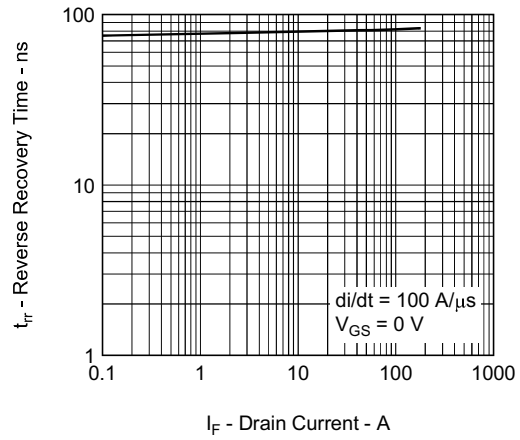
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

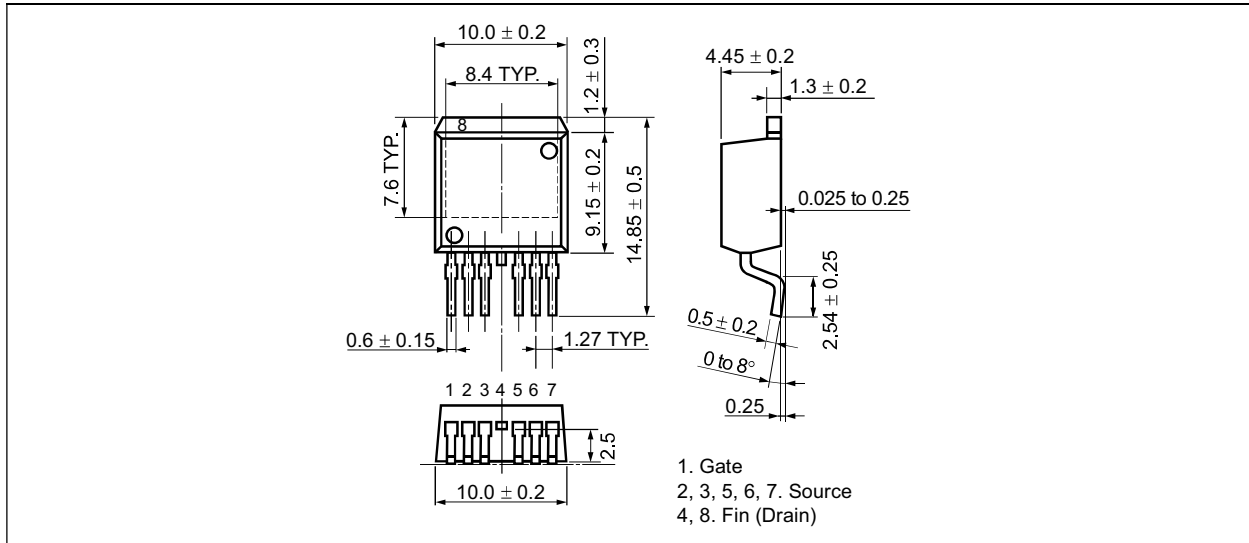


REVERSE RECOVERY TIME vs. DRAIN CURRENT

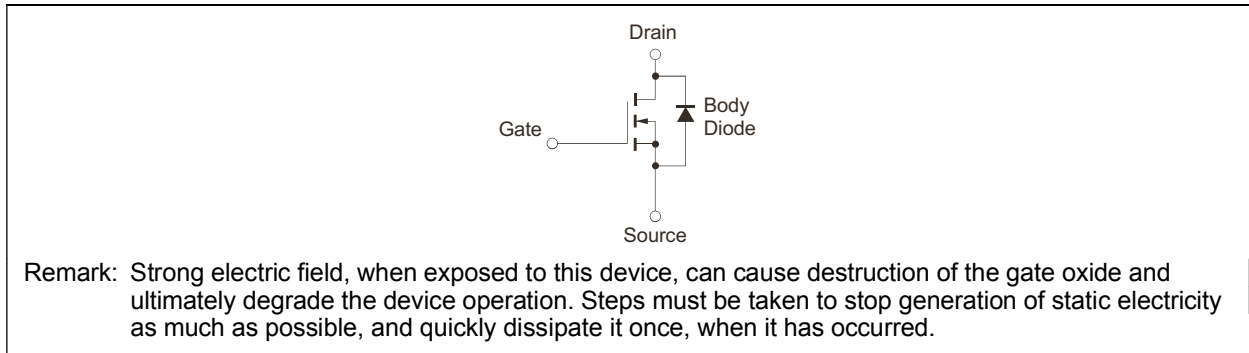


Package Drawing (Unit: mm)

TO-263-7pin (MP-25ZT) (Mass: 1.5 g TYP.)



Equivalent Circuit



Revision History	NP180N055TUK Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Dec 12, 2011	—	First Edition Issued

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