



ISL9V3040D3S

Preliminary

Insulated Gate Bipolar Transistor

300mJ, 400V, N-CHANNEL
IGNITION IGBT

DESCRIPTION

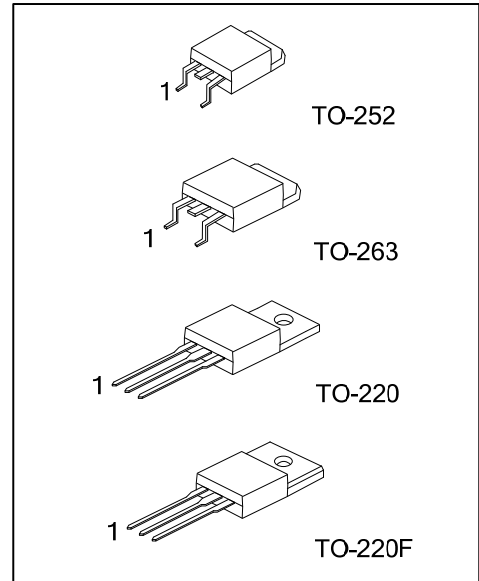
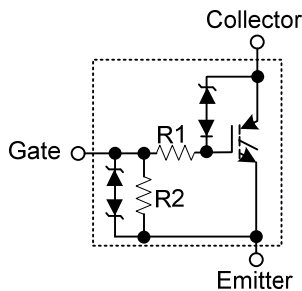
The UTC **ISL9V3040D3S** is an N-channel ignition Insulated Gate Bipolar Transistor. It uses UTC's advanced technology to provide customers with outstanding SCIS capability.

The UTC **ISL9V3040D3S** is suitable for Coil -On plug applications and Automotive Ignition Coil driver circuits, etc.

FEATURES

- * Outstanding SCIS capability
- * Logic level gate drive

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
ISL9V3040D3SL-TA3-T	ISL9V3040D3SG-TA3-T	TO-220	G	C	E	Tube
ISL9V3040D3SL-TF3-T	ISL9V3040D3SG-TF3-T	TO-220F	G	C	E	Tube
ISL9V3040D3SL-TN3-R	ISL9V3040D3SG-TN3-R	TO-252	G	C	E	Tape Reel
ISL9V3040D3SL-TQ2-T	ISL9V3040D3SG-TQ2-T	TO-263	G	C	E	Tube
ISL9V3040D3SL-TQ2-R	ISL9V3040D3SG-TQ2-R	TO-263	G	C	E	Tape Reel

Note: Pin Assignment: G: Gate C: Collector E: Emitter

ISL9V3040D3SL-TA3-T	(1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TN3: TO-252 TQ2: TO-263 (3) L: Lead Free, G: Halogen Free and Lead Free
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MARKING

To-220 / TO-220F / TO-263	TO-252

■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, unless otherwise noted)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector to Emitter Breakdown Voltage		BV_{CER}	450	V
Emitter to Collector Voltage Reverse Battery Condition		BV_{ECS}	30	V
At Starting	$T_J=25^\circ\text{C}$, $I_{\text{SCIS}}=14.2\text{A}$, $L=3.0\text{mHy}$	E_{SCIS}	300	mJ
	$T_J=150^\circ\text{C}$, $I_{\text{SCIS}}=10.6\text{A}$, $L=3.0\text{mHy}$		170	mJ
Continuous Collector Current	$T_C=25^\circ\text{C}$	I_C	21	A
	$T_C=110^\circ\text{C}$		17	A
Gate to Emitter Voltage Continuous		V_{GEM}	± 10	V
Power Dissipation Total at $T_C=25^\circ\text{C}$	TO-220/TO-263	P_D	125	W
	TO-220F		41.6	
	TO-252		125	
Power Dissipation Derating $T_C>25^\circ\text{C}$	TO-220/TO-263		1	$\text{W}/^\circ\text{C}$
	TO-220F		0.332	
	TO-252		1	
Electrostatic Discharge Voltage at 100pF, 1500Ω		ESD	4	kV
Junction Temperature		T_J	$-40\sim 175$	$^\circ\text{C}$
Storage Temperature Range		T_{STG}	$-40\sim 175$	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	TO-220/TO-252	θ_{JC}	1.0	$^\circ\text{C}/\text{W}$
	TO-263			
	TO-220F		3.0	

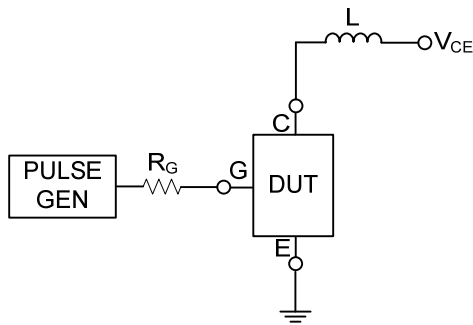
■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Off State Characteristics							
Collector to Emitter Breakdown Voltage	BV_{CER}	$I_{\text{C}}=2\text{mA}$, $V_{\text{GE}}=0\text{V}$, $R_{\text{G}}=1\text{K}\Omega$, $T_{\text{J}}=-40\sim 150^{\circ}\text{C}$		350	400	450	V
Collector to Emitter to Breakdown Voltage	BV_{CES}	$I_{\text{C}}=10\text{mA}$, $V_{\text{GE}}=0\text{V}$, $R_{\text{G}}=0$, $T_{\text{J}}=-40\sim 150^{\circ}\text{C}$		400	450	500	V
Emitter to Collector Breakdown Voltage	BV_{ECS}	$I_{\text{C}}=-75\text{mA}$, $V_{\text{GE}}=0\text{V}$, $T_{\text{C}}=25^{\circ}\text{C}$		30			V
Gate to Emitter Breakdown Voltage	BV_{GES}	$I_{\text{GES}}=\pm 2\text{mA}$		± 12	± 14		V
Collector to Emitter Leakage Current	I_{CER}	$V_{\text{CER}}=250\text{V}$, $R_{\text{G}}=1\text{K}\Omega$	$T_{\text{C}}=25^{\circ}\text{C}$			25	μA
			$T_{\text{C}}=150^{\circ}\text{C}$			1	mA
Emitter to Collector Leakage Current	I_{ECS}	$V_{\text{EC}}=24\text{V}$	$T_{\text{C}}=25^{\circ}\text{C}$			1	mA
			$T_{\text{C}}=150^{\circ}\text{C}$			40	mA
Series Gate Resistance	R_1				70		Ω
Gate to Emitter Resistance	R_2			10K		26K	Ω
On State Characteristics							
Collector to Emitter Saturation Voltage	$V_{\text{CE(SAT)}}$	$I_{\text{C}}=6\text{A}$, $V_{\text{GE}}=4\text{V}$	$T_{\text{C}}=25^{\circ}\text{C}$		1.25	1.60	V
		$I_{\text{C}}=10\text{A}$, $V_{\text{GE}}=4.5\text{V}$	$T_{\text{C}}=150^{\circ}\text{C}$		1.40	1.80	V
		$I_{\text{C}}=15\text{A}$, $V_{\text{GE}}=4.5\text{V}$	$T_{\text{C}}=150^{\circ}\text{C}$		1.90	2.20	V
Dynamic Characteristics							
Gate Charge	$Q_{\text{G(ON)}}$	$I_{\text{C}}=10\text{A}$, $V_{\text{CE}}=12\text{V}$, $V_{\text{GE}}=5\text{V}$			17		nC
Gate to Emitter Threshold Voltage	$V_{\text{GE(TH)}}$	$I_{\text{C}}=1.0\text{mA}$, $V_{\text{CE}}=V_{\text{GE}}$		1.3		2.2	V
Gate to Emitter Plateau Voltage	V_{GEP}	$I_{\text{C}}=10\text{A}$, $V_{\text{CE}}=12\text{V}$			3.0		V
Switching Characteristics							
Current Turn-On Delay Time-Resistive	$t_{\text{d(ON)R}}$	$V_{\text{CE}}=14\text{V}$, $R_{\text{L}}=1\Omega$, $V_{\text{GE}}=5\text{V}$, $R_{\text{G}}=1\text{K}\Omega$, $T_{\text{J}}=25^{\circ}\text{C}$			0.48	4	μs
Current Rise Time-Resistive	t_{rR}				2.1	7	μs
Current Turn-Off Delay Time-Inductive	$t_{\text{d(OFF)L}}$				1.4	15	μs
Current Fall Time Inductive	t_{fL}				2.2	15	μs
Self Clamped Inductive Switching	SCIS	$T_{\text{J}}=25^{\circ}\text{C}$, $L=3.0\text{mHy}$, $R_{\text{G}}=1\text{K}\Omega$, $V_{\text{GE}}=5\text{V}$				300	mJ

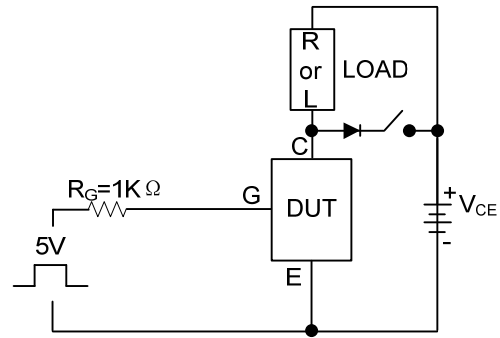
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

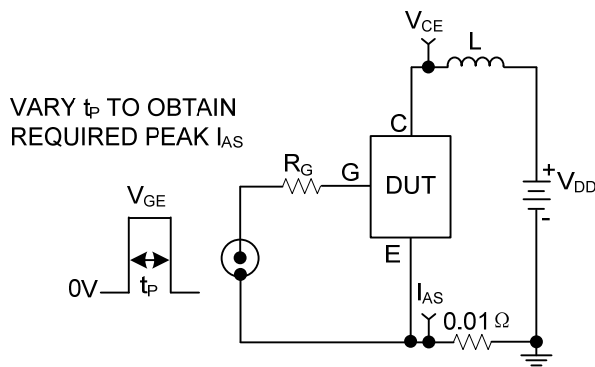
■ TEST CIRCUIT AND WAVEFORMS



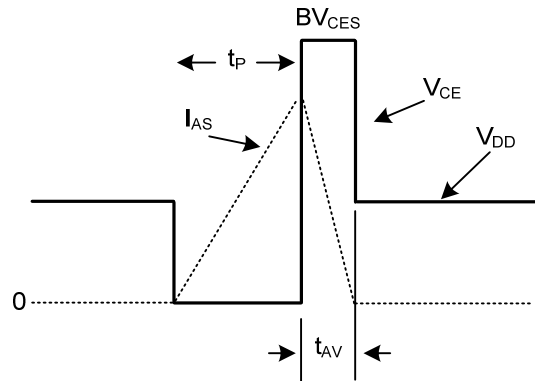
Inductive Switching Test Circuit



t_{ON} and t_{OFF} Switching Test Circuit



Energy Test Circuit



Energy Waveforms

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