



N-CHANNEL MOSFET

Qualified per MIL-PRF-19500/555

Qualified Levels:
JAN, JANTX, and
JANTXV

DESCRIPTION

These 2N6788U and 2N6790U devices are military qualified up to a JANTXV level for high-reliability applications. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- Surface mount equivalent of JEDEC registered 2N6788 and 2N6790 numbers.
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/555.
- RoHS compliant by design.

APPLICATIONS / BENEFITS

- High frequency operation.
- Lightweight, low-profile package.
- ESD rated to class 1A.

MAXIMUM RATINGS @ T_C = +25 °C unless otherwise noted

Parameters / Test Conditions	Symbol	Value	Unit	
Junction & Storage Temperature	T _J , T _{stg}	-55 to +150	°C	
Thermal Resistance Junction-to-Case (see Figure 1)	R _{θJC}	8.93	°C/W	
Total Power Dissipation ⁽¹⁾	P _T	0.8	W	
Drain to Gate Voltage	V _{DG}	2N6788U 2N6790U	100 200	V
Drain – Source Voltage		V _{DS}	2N6788U 2N6790U	100 200
Gate – Source Voltage	V _{GS}		± 20	V
Drain Current, dc @ T _C = +25 °C ⁽²⁾ (see Figure ?)	I _{D1}	2N6788U 2N6790U	4.5 2.8	A
Drain Current, dc @ T _C = +100 °C		I _{D2}	2N6788U 2N6790U	2.8 1.8
Off-State Current ⁽³⁾	I _{DM}		2N6788U 2N6790U	18 11
Source Current		I _S	2N6788U 2N6790U	4.5 2.8

- Notes:**
1. Derated linearly by 0.11 W/°C for T_C > +25 °C.
 2. The following formula derives the maximum theoretical I_D limit. I_D is also limited by package and internal wires and may be limited due to pin diameter.

$$I_D = \sqrt{\frac{T_J(\text{max}) - T_C}{R_{\theta JC} \times R_{DS(\text{on})} @ T_J(\text{max})}}$$

3. I_{DM} = 4 × I_{D1}; I_{D1} as calculated in note 2.



**U-18 LCC
Package**

Also available in:

TO-205AF Package
(leaded)

 [2N6788 & 2N6790](#)

MSC – Lawrence

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Lawrence, MA 01841
Tel: 1-800-446-1158 or
(978) 620-2600
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MSC – Ireland

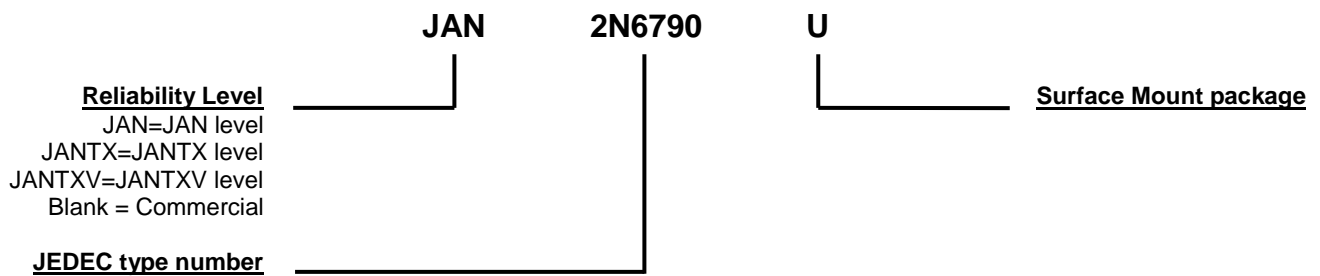
Gort Road Business Park,
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MECHANICAL and PACKAGING

- CASE: Ceramic LCC-18 with kovar gold plated lid.
- TERMINALS: Gold plating over nickel.
- MARKING: Manufacturer's ID, part number, date code, ESD symbol at pin 1 location.
- TAPE & REEL option: Standard per EIA-481-D. Consult factory for quantities.
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

SYMBOLS & DEFINITIONS

Symbol	Definition
I_D	Drain current.
I_F	Forward current.
T_C	Case temperature.
V_{DD}	Drain supply voltage.
V_{DS}	Drain to source voltage.
V_{GS}	Gate to source voltage.

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^\circ\text{C}$, unless otherwise noted

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Drain-Source Breakdown Voltage $V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	2N6788U 2N6790U $V_{(BR)DSS}$	100 200		V
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}, I_D = 0.25\text{ mA}$ $V_{DS} \geq V_{GS}, I_D = 0.25\text{ mA}, T_j = +125\text{ }^\circ\text{C}$ $V_{DS} \geq V_{GS}, I_D = 0.25\text{ mA}, T_j = -55\text{ }^\circ\text{C}$	$V_{GS(th)1}$ $V_{GS(th)2}$ $V_{GS(th)3}$	2.0 1.0	4.0 5.0	V
Gate Current $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$ $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}, T_j = +125\text{ }^\circ\text{C}$	I_{GSS1} I_{GSS2}		± 100 ± 200	nA

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS				
Drain Current $V_{GS} = 0\text{ V}, V_{DS} = 80\text{ V}$ $V_{GS} = 0\text{ V}, V_{DS} = 160\text{ V}$	2N6788U 2N6790U I_{DSS1}		25	μA
Drain Current $V_{GS} = 0\text{ V}, V_{DS} = 80\text{ V}, T_j = +125\text{ }^\circ\text{C}$ $V_{GS} = 0\text{ V}, V_{DS} = 160\text{ V}, T_j = +125\text{ }^\circ\text{C}$	2N6788U 2N6790U I_{DSS2}		0.25	mA
Static Drain-Source On-State Resistance $V_{GS} = 10\text{ V}, I_D = 3.5\text{ A pulsed}$ $V_{GS} = 10\text{ V}, I_D = 2.25\text{ A pulsed}$	2N6788U 2N6790U $r_{DS(on)1}$		0.30 0.80	Ω
Static Drain-Source On-State Resistance $V_{GS} = 10\text{ V}, I_D = 6.0\text{ A pulsed}$ $V_{GS} = 10\text{ V}, I_D = 3.5\text{ A pulsed}$	2N6788U 2N6790U $r_{DS(on)2}$		0.35 0.85	Ω
Static Drain-Source On-State Resistance $T_j = +125\text{ }^\circ\text{C}$: $V_{GS} = 10\text{ V}, I_D = 3.5\text{ A pulsed}$ $V_{GS} = 10\text{ V}, I_D = 2.25\text{ A pulsed}$	2N6788U 2N6790U $r_{DS(on)3}$		0.54 1.50	Ω
Diode Forward Voltage $V_{GS} = 0\text{ V}, I_D = 6.0\text{ A pulsed}$ $V_{GS} = 0\text{ V}, I_D = 3.5\text{ A pulsed}$	2N6788U 2N6790U V_{SD}		1.8 1.5	V

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^\circ\text{C}$, unless otherwise noted (continued)
DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Gate Charge:				
On-State Gate Charge $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $V_{DS} = 50\text{ V}$ $V_{GS} = 10\text{ V}$, $I_D = 3.5\text{ A}$, $V_{DS} = 100\text{ V}$	2N6788U 2N6790U $Q_{g(on)}$		18.0 14.3	nC
Gate to Source Charge $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $V_{DS} = 50\text{ V}$ $V_{GS} = 10\text{ V}$, $I_D = 3.5\text{ A}$, $V_{DS} = 100\text{ V}$	2N6788U 2N6790U Q_{gs}		4.0 3.0	nC
Gate to Drain Charge $V_{GS} = 10\text{ V}$, $I_D = 6.0\text{ A}$, $V_{DS} = 50\text{ V}$ $V_{GS} = 10\text{ V}$, $I_D = 3.5\text{ A}$, $V_{DS} = 100\text{ V}$	2N6788U 2N6790U Q_{gd}		9.0 9.0	nC

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-on delay time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$	2N6788U 2N6790U $t_{d(on)}$		40	ns
Rinse time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$	2N6788U 2N6790U t_r		70 50	ns
Turn-off delay time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$	2N6788U 2N6790U $t_{d(off)}$		40 50	ns
Fall time $I_D = 6.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 35\text{ V}$ $I_D = 3.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 7.5\text{ }\Omega$, $V_{DD} = 74\text{ V}$	2N6788U 2N6790U t_f		70 50	ns
Diode Reverse Recovery Time $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} \leq 50\text{ V}$, $I_F = 6.0\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} \leq 50\text{ V}$, $I_F = 3.5\text{ A}$	2N6788U 2N6790U t_{rr}		240 400	ns

GRAPHS

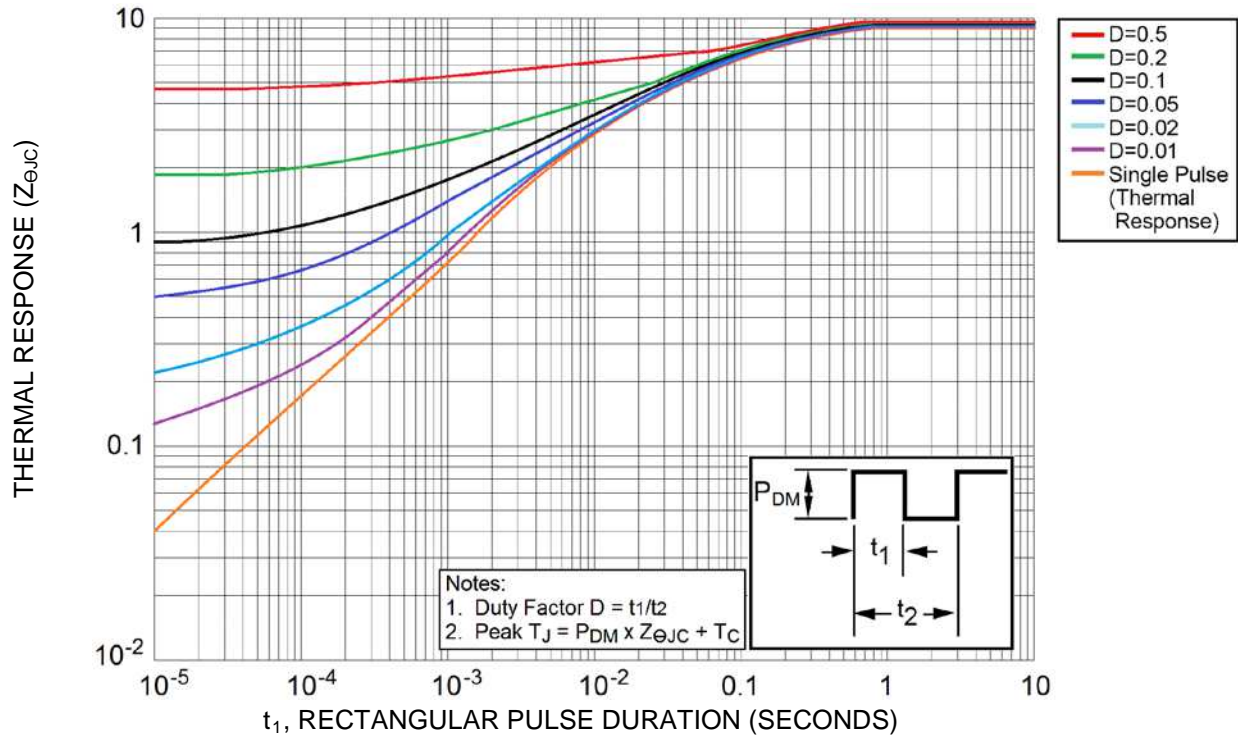


Figure 1
 Thermal Impedance Curves

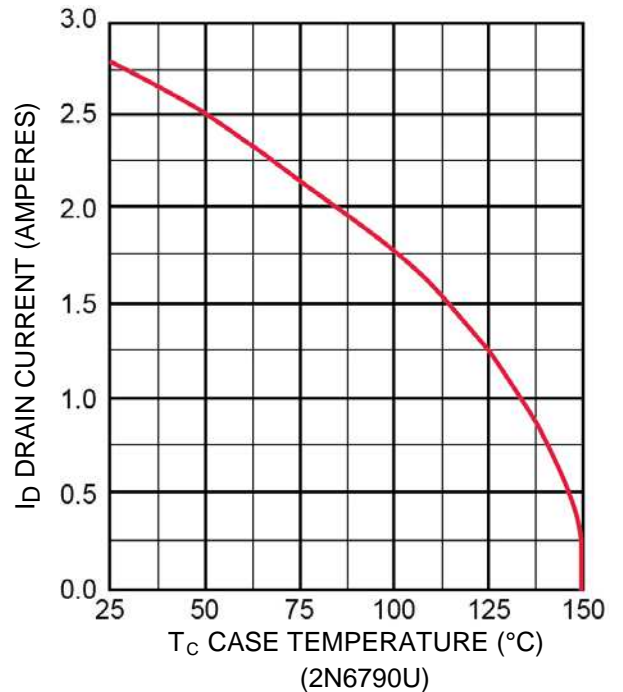
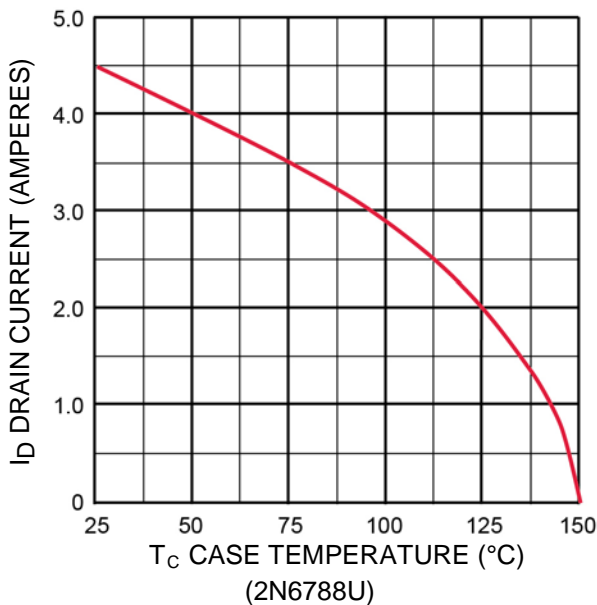
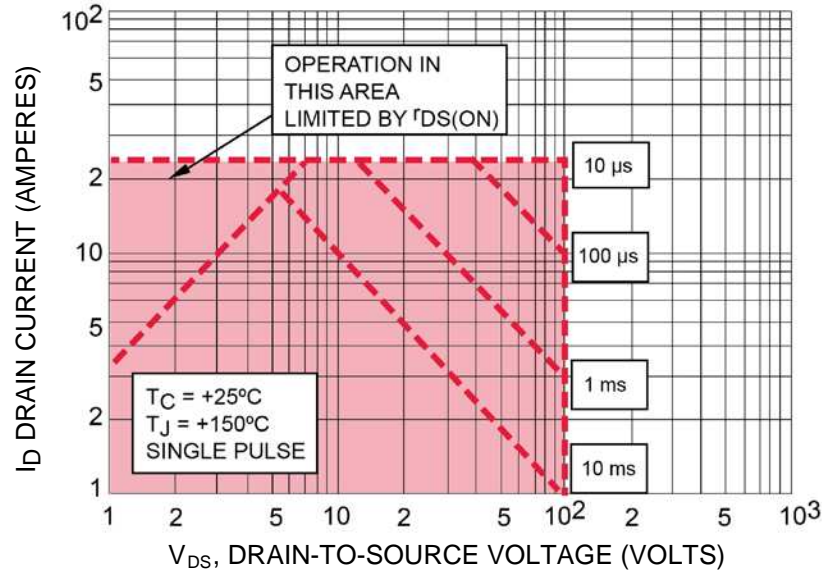
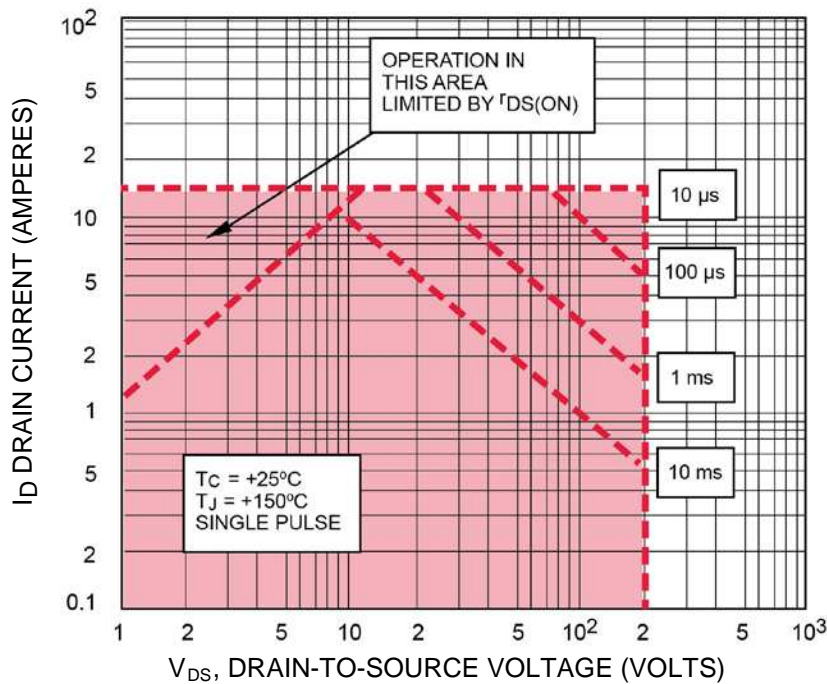


Figure 2
 Maximum Drain Current vs. Case Temperature Graph

GRAPHS (continued)

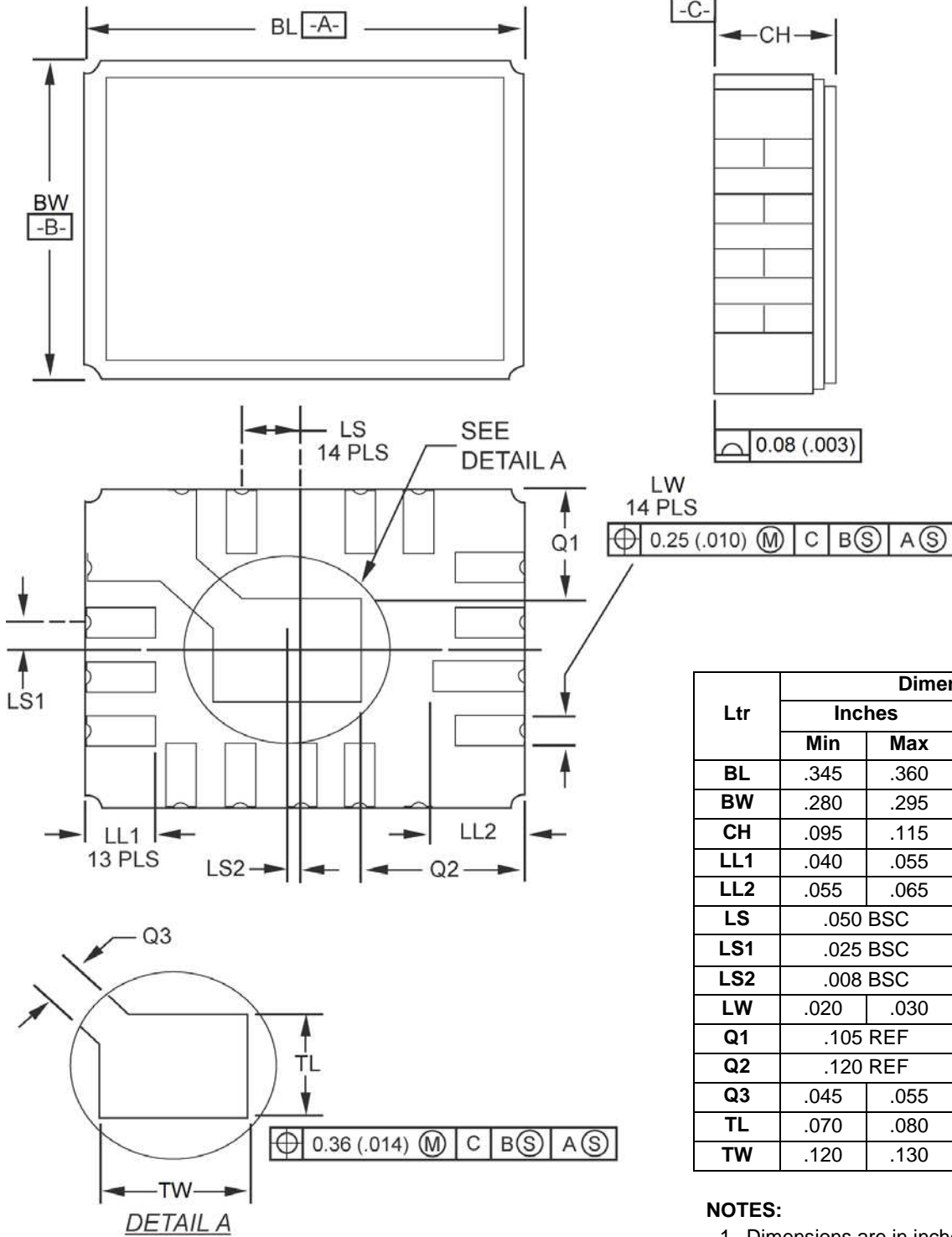


Maximum Safe Operating Area (2N6788U)



Maximum Safe Operating Area (2N6790U)

PACKAGE DIMENSIONS

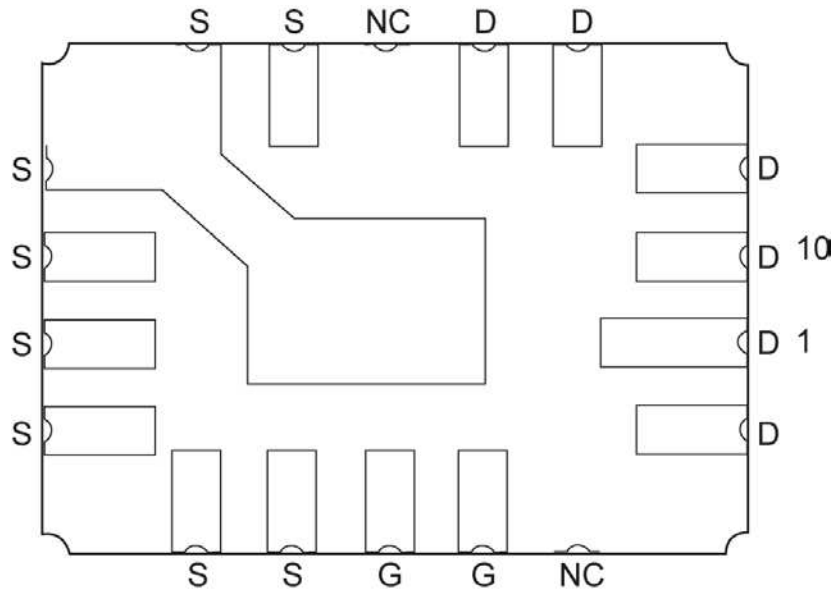


Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.345	.360	8.77	9.14
BW	.280	.295	7.12	7.49
CH	.095	.115	2.42	2.92
LL1	.040	.055	1.02	1.39
LL2	.055	.065	1.40	1.65
LS	.050 BSC		1.27 BSC	
LS1	.025 BSC		0.635 BSC	
LS2	.008 BSC		0.203 BSC	
LW	.020	.030	0.51	0.76
Q1	.105 REF		2.67 REF	
Q2	.120 REF		3.05 REF	
Q3	.045	.055	1.14	1.40
TL	.070	.080	1.78	2.03
TW	.120	.130	3.05	3.30

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

PAD LAYOUT



PAD ASSIGNMENTS