

### TO-92S



#### Pin Definition:

1. V<sub>CC</sub>
2. GND
3. Output

### SOT-23



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## Description

TSH282 is an unipolar Hall effect sensor IC. It incorporates advanced chopper stabilization technology to provide accurate and stable magnetic switch points. The design, specifications and performance have been optimized for applications of solid state switches. The output transistor will be switched on (B<sub>OP</sub>) in the presence of a sufficiently strong South pole magnetic field facing the marked side of the package. Similarly, the output will be switched off (B<sub>RP</sub>) in the presence of a weaker South field and remain off with "0" field.

## Features

- CMOS Hall IC Technology
- Solid-State Reliability
- Chopper stabilized amplifier stage
- Unipolar, output switches with absolute value of South pole from magnet
- Operation down to 3.0V
- High Sensitivity for direct reed switch replacement applications

## Ordering Information

| Part No.     | Package | Packing          |
|--------------|---------|------------------|
| TSH282CT B0G | TO-92S  | 1Kpcs / Bulk Bag |
| TSH282CX RFG | SOT-23  | 3Kpcs / 7" Reel  |

**Note:** "G" denote for Halogen Free Product

## Application

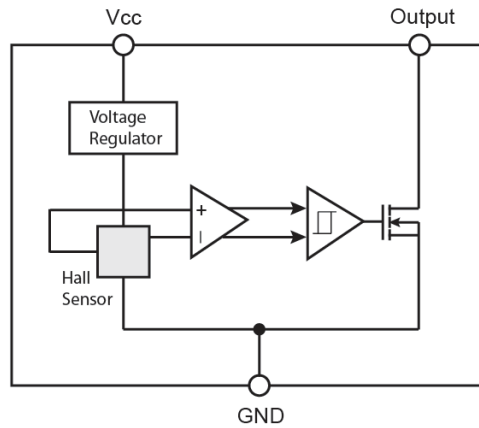
- Solid state switch
- Limit switch, Current limit
- Interrupter
- Current sensing
- Magnet proximity sensor for reed switch replacement

## Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

| Characteristics                          | Limit               | Value       | Unit  |
|------------------------------------------|---------------------|-------------|-------|
| Supply voltage                           | V <sub>CC</sub>     | 27          | V     |
| Output Voltage                           | V <sub>OUT</sub>    | 27          | V     |
| Reverse voltage                          | V <sub>CC/OUT</sub> | -0.3        | V     |
| Magnetic flux density                    |                     | Unlimited   | Gauss |
| Output current                           | I <sub>OUT</sub>    | 50          | mA    |
| Operating Temperature Range              | T <sub>OPR</sub>    | -40 to +85  | °C    |
| Storage temperature range                | T <sub>STG</sub>    | -55 to +150 | °C    |
| Maximum Junction Temp                    | T <sub>J</sub>      | 150         | °C    |
| Thermal Resistance - Junction to Ambient | TO-92S              | 206         | °C/W  |
|                                          | SOT-23              | 543         |       |
| Thermal Resistance - Junction to Case    | TO-92S              | 148         | °C/W  |
|                                          | SOT-23              | 410         |       |
| Package Power Dissipation                | TO-92S              | 606         | mW    |
|                                          | SOT-23              | 230         |       |

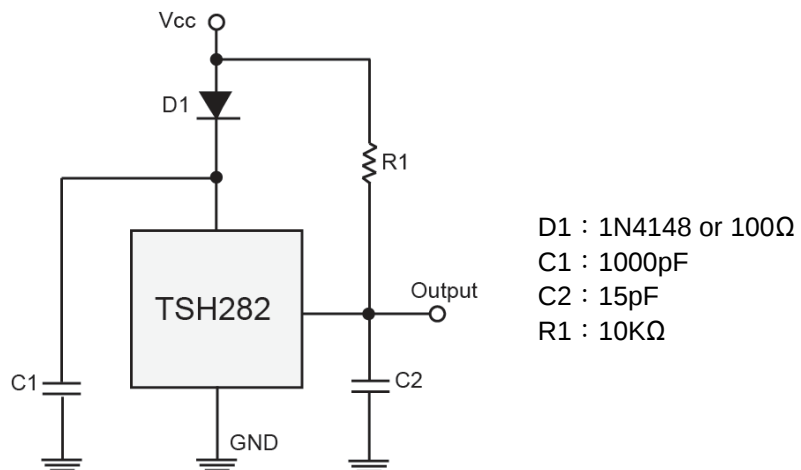
**Note:** Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

### Block Diagram



**Note:** Static sensitive device; please observe ESD precautions. Reverse VDD protection is not included. For reverse voltage protection, a 100Ω resistor in series with VDD is recommended.

### Typical Application Circuit



### Electrical Specifications (DC Operating Parameters : $T_A=+25^{\circ}\text{C}$ , $V_{CC}=12\text{V}$ )

| Parameters             | Test Conditions                                 | Min | Typ  | Max | Units |
|------------------------|-------------------------------------------------|-----|------|-----|-------|
| Supply Voltage         | Operating                                       | 3.0 | --   | 24  | V     |
| Supply Current         | $B < B_{OP}$                                    | --  | 2.5  | 5.0 | mA    |
| Output Low Voltage     | $I_{OUT} = 20\text{mA}$ , $B > B_{OP}$          | --  | --   | 500 | mV    |
| Output Leakage Current | $I_{OFF}$ $B < B_{RP}$ , $V_{OUT} = 20\text{V}$ | --  | --   | 10  | uA    |
| Output Rise Time       | $R_L = 1\text{k}\Omega$ , $C_L = 20\text{pF}$   | --  | 0.04 | --  | uS    |
| Output Fall Time       | $R_L = 1\text{k}\Omega$ ; $C_L = 20\text{pF}$   | --  | 0.18 | --  | uS    |

## Magnetic Specifications

DC Operating Parameters :  $T_A = +25^{\circ}\text{C}$ ,  $V_{DD} = 12\text{V}$

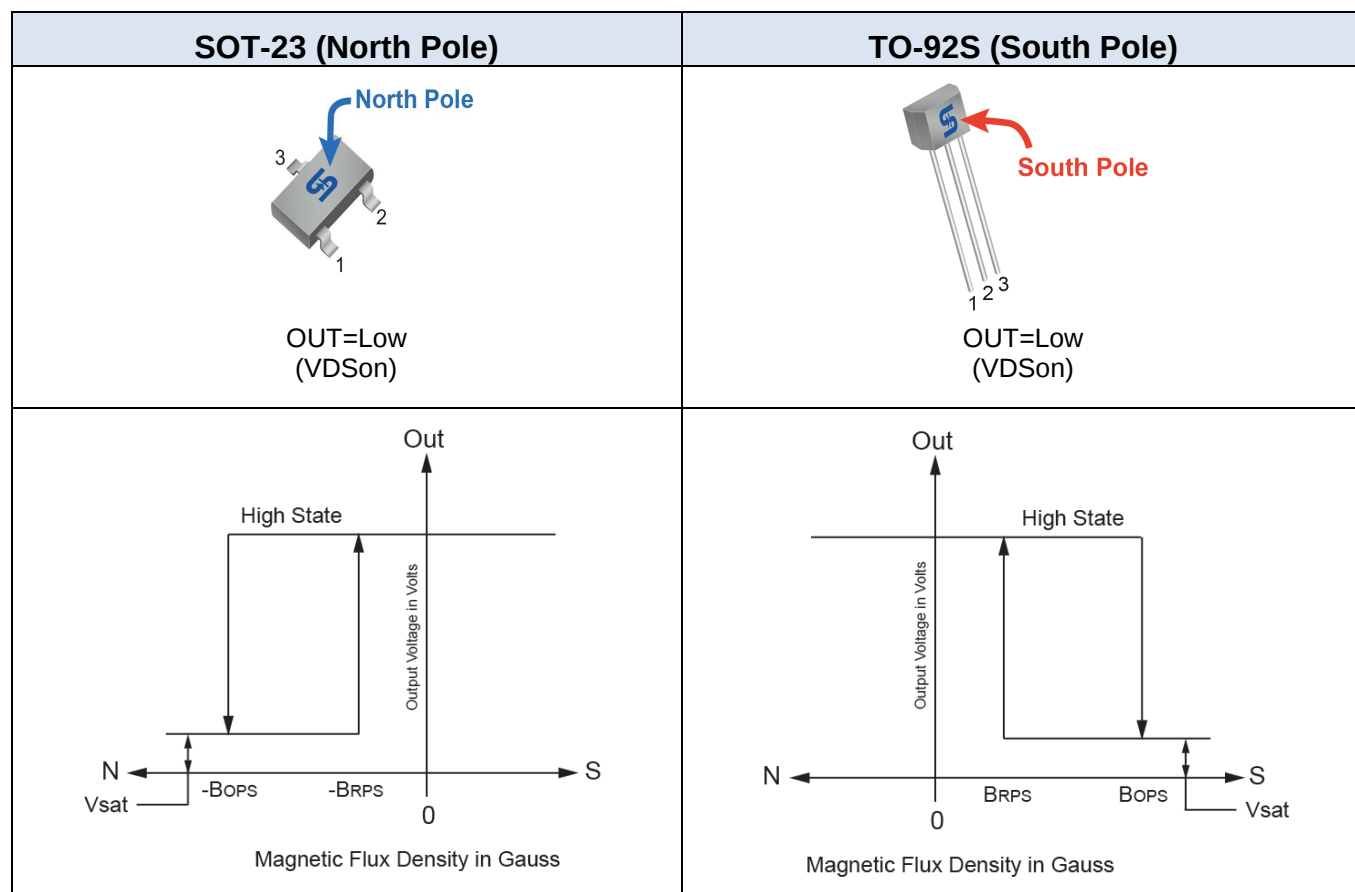
| Parameter     | Symbol    | Test condition | Min | Typ | Max | Unit  |
|---------------|-----------|----------------|-----|-----|-----|-------|
| Operate Point | $B_{OP}$  |                | 45  | --  | 100 | Gauss |
| Release Point | $B_{RP}$  |                | 25  | --  | 70  | Gauss |
| Hysteresis    | $B_{HYS}$ |                | --  | 20  | --  | Gauss |

**Note:** 1G (Gauss) = 0.1mT (millitesla)

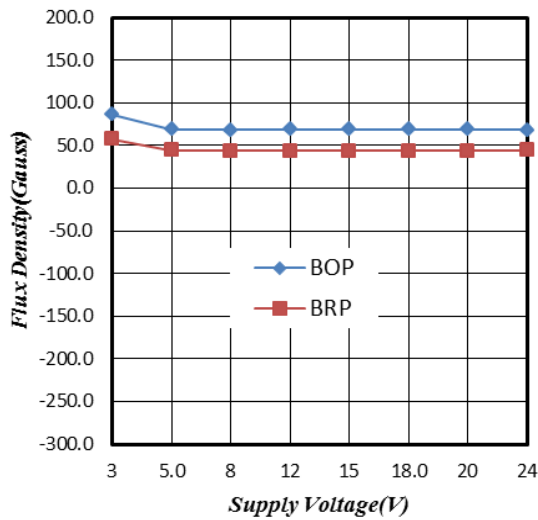
## Output Behavior versus Magnetic Pole

DC Operating Parameters  $T_A = -40$  to  $125^{\circ}\text{C}$ ,  $V_{DD} = 3.0 \sim 24\text{V}$

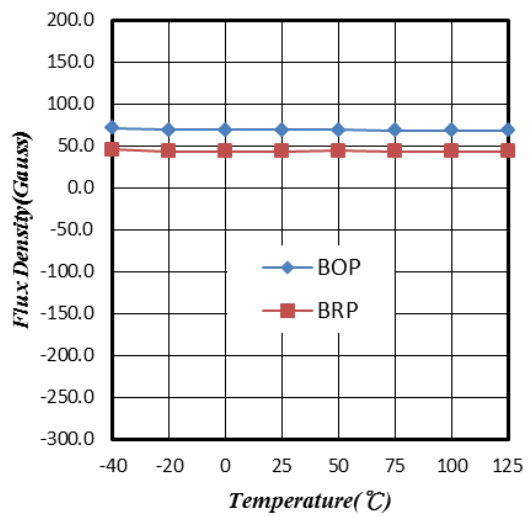
| Parameter                   | Test condition                | OUT(TO-92S)           | OUT(SOT-23)           |
|-----------------------------|-------------------------------|-----------------------|-----------------------|
| South pole                  | $B > B_{OP}[(100) \sim (45)]$ | Low                   | Open(Pull-up Voltage) |
| Null or weak magnetic field | $-B_{RP} \sim +B_{RP}$        | Open(Pull-up Voltage) | Open(Pull-up Voltage) |
| North pole                  | $B < -B_{OP}(-25 \sim -70)$   | Open(Pull-up Voltage) | Low                   |



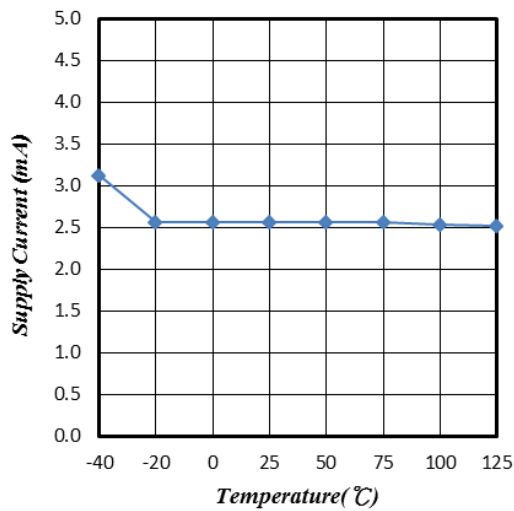
### Characteristic Performance



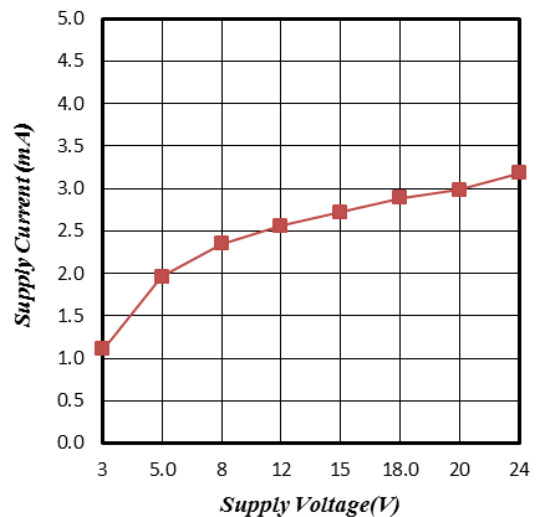
**Figure 1. Supply Voltage vs. Flux Density**



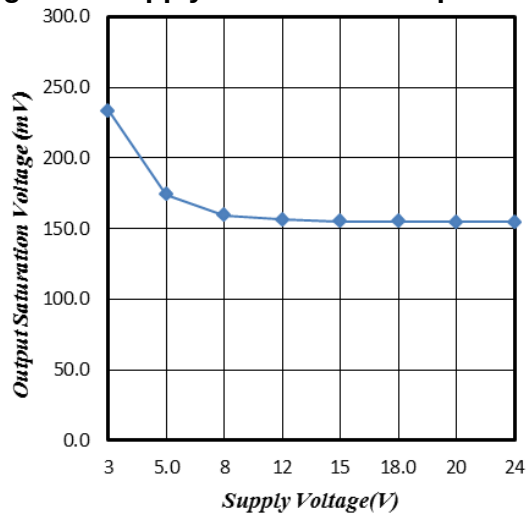
**Figure 2. Temperature vs. Flux Density**



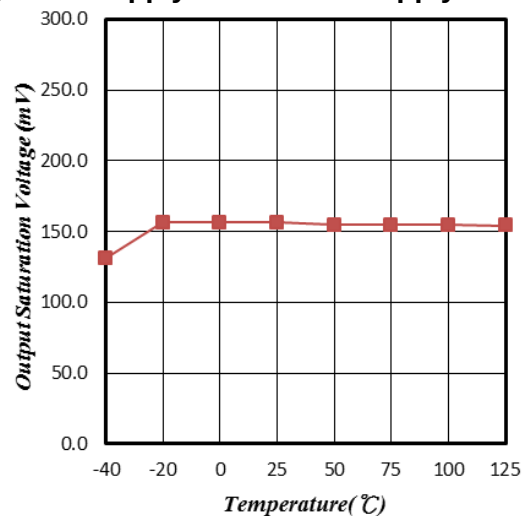
**Figure 3. Supply Current vs. Temperature**



**Figure 4. Supply Current vs. Supply Voltage**

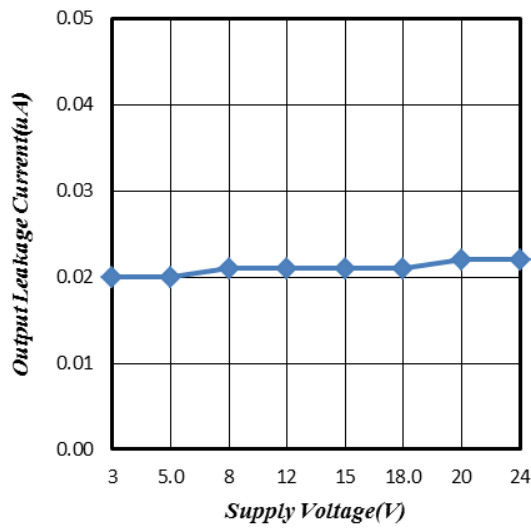


**Figure 5. Output Saturation Voltage vs. Supply Voltage**

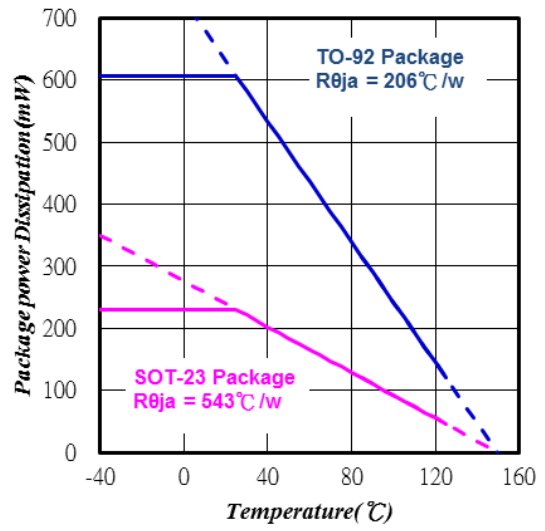


**Figure 6. Output Saturation Voltage vs. Temperature**

### Characteristic Performance

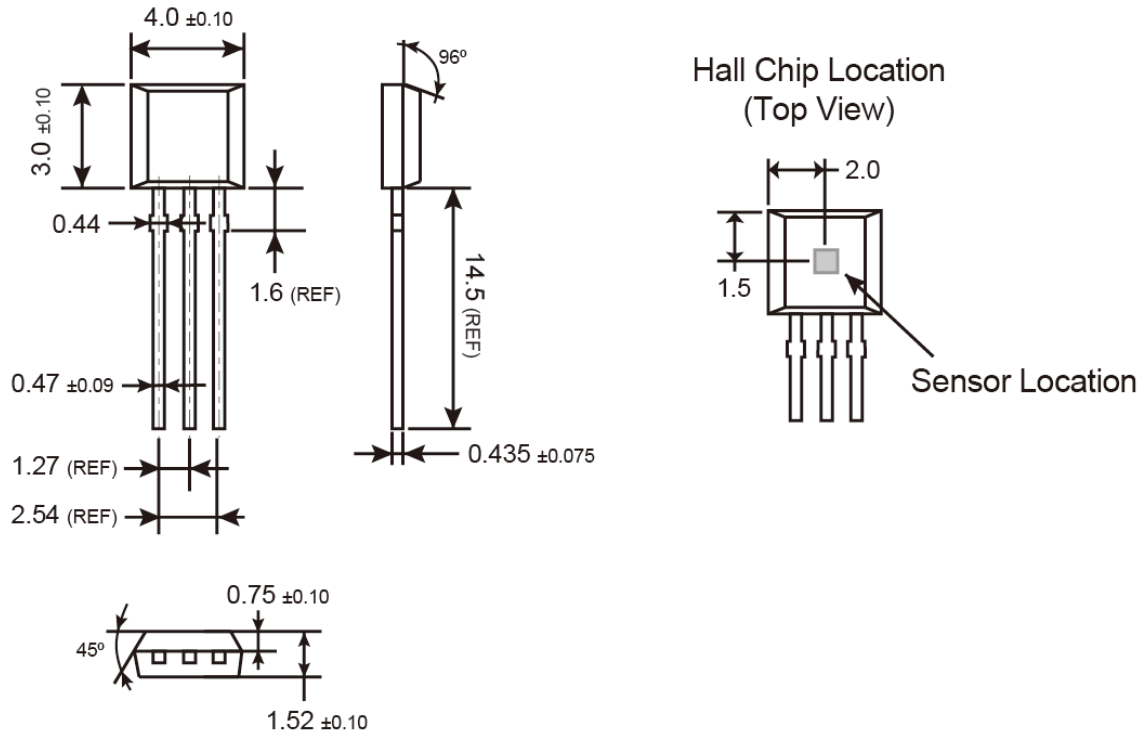


**Figure 7. Output Leakage Current vs. Supply Voltage**



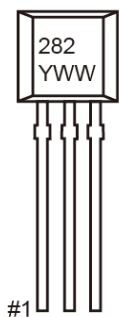
**Figure 8. Power Dissipation vs. Temperature**

## TO-92S Mechanical Drawing



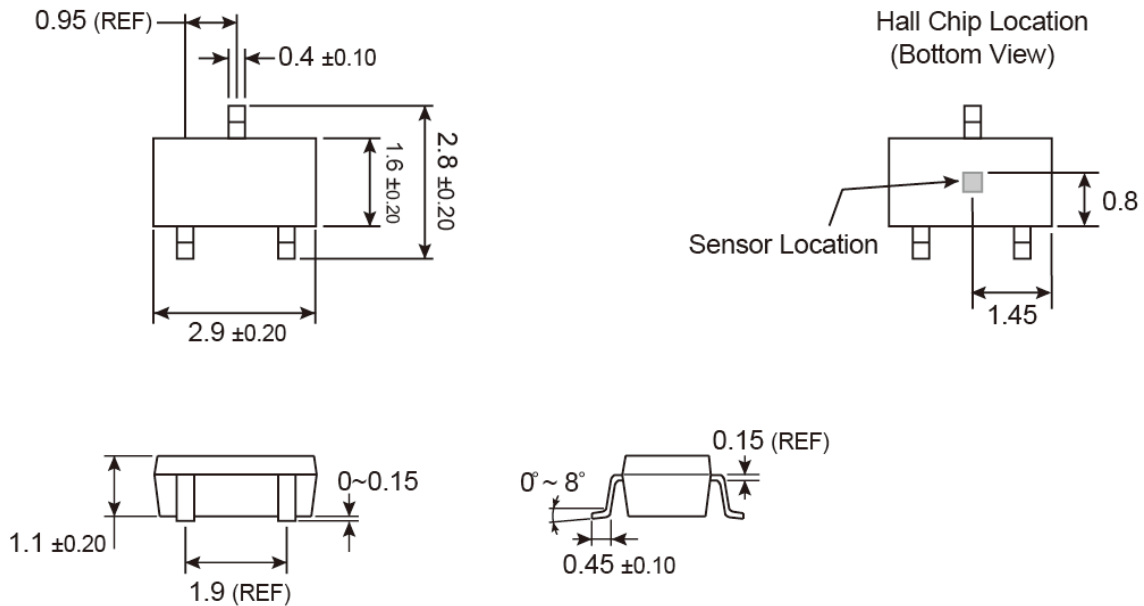
Unit: Millimeters

## Marking Diagram



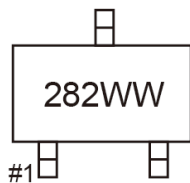
**282** = Device Code  
**Y** = Year Code (3=2013, 4=2014....)  
**WW** = Week Code (01~52)

## SOT-23 Mechanical Drawing



Unit: Millimeters

## Marking Diagram



**282** = Device Code

**WW** = Week Code Table

|      |    |    |    |    |    |    |    |    |    |    |    |    |    |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|
| week | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 |
| code | OA | OB | OC | OD | OE | OF | OG | OH | OI | OJ | OK | OL | OM |
| week | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| code | ON | OO | OP | OQ | OR | OS | OT | OU | OV | OW | OX | OY | OZ |
| week | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| code | PA | PB | PC | PD | PE | PF | PG | PH | PI | PJ | PK | PL | PM |
| week | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 |
| code | PN | PO | PP | PQ | PR | PS | PT | PU | PV | PW | PX | PY | PZ |

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