

# NAG Fortran Library Routine Document

## F06ULF

**Note:** before using this routine, please read the Users' Note for your implementation to check the interpretation of *bold italicised* terms and other implementation-dependent details.

### 1 Purpose

F06ULF returns, via the function name, the value of the 1-norm, the  $\infty$ -norm, the Frobenius norm, or the maximum absolute value of the elements of a complex  $n$  by  $n$  triangular band matrix.

### 2 Specification

*double precision* FUNCTION F06ULF (NORM, UPLO, DIAG, N, K, AB, LDAB, WORK)  
 INTEGER N, K, LDAB  
*double precision* WORK(\*)  
*complex\*16* AB(LDAB,\*)  
 CHARACTER\*1 NORM, UPLO, DIAG

### 3 Description

None.

### 4 References

None.

### 5 Parameters

- 1: NORM – CHARACTER\*1 *Input*  
*On entry:* specifies the value to be returned:  
 if NORM = '1' or 'O', the 1-norm;  
 if NORM = 'I', the  $\infty$ -norm;  
 if NORM = 'F' or 'E', the Frobenius (or Euclidean) norm;  
 if NORM = 'M', the value  $\max_{i,j} |a_{ij}|$  (not a norm).  
*Constraint:* NORM = '1', 'O', 'I', 'F', 'E' or 'M'.
- 2: UPLO – CHARACTER\*1 *Input*  
*On entry:* specifies whether  $A$  is upper or lower triangular as follows:  
 if UPLO = 'U',  $A$  is upper triangular;  
 if UPLO = 'L',  $A$  is lower triangular.  
*Constraint:* UPLO = 'U' or 'L'.
- 3: DIAG – CHARACTER\*1 *Input*  
*On entry:* specifies whether  $A$  has non-unit or unit diagonal elements, as follows:  
 if DIAG = 'N', the diagonal elements are stored explicitly;  
 if DIAG = 'U', the diagonal elements are assumed to be 1, and are not referenced.  
*Constraint:* DIAG = 'N' or 'U'.

- 4: N – INTEGER *Input*  
*On entry:*  $n$ , the order of the matrix  $A$ .  
*Constraint:*  $N \geq 0$ .
- 5: K – INTEGER *Input*  
*On entry:*  $k$ , the number of sub-diagonals or super-diagonals of the matrix  $A$ .  
*Constraint:*  $K \geq 0$ .
- 6: AB(LDAB,\*) – **complex\*16** array *Input*  
**Note:** the second dimension of the array AB must be at least  $\max(1, N)$ .  
*On entry:* the  $n$  by  $n$  triangular band matrix  $A$ , stored in rows 1 to  $k + 1$ . More precisely, if UPLO = 'U', the elements of the upper triangle of  $A$  within the band must be stored with element  $a_{ij}$  in  $AB(k + 1 + i - j, j)$  for  $\max(1, j - k) \leq i \leq j$ ; if UPLO = 'L', the elements of the lower triangle of  $A$  within the band must be stored with element  $a_{ij}$  in  $AB(1 + i - j, j)$  for  $j \leq i \leq \min(n, j + k)$ . If DIAG = 'U', the diagonal elements of  $A$  are assumed to be 1, and are not referenced.
- 7: LDAB – INTEGER *Input*  
*On entry:* the first dimension of the array AB as declared in the (sub)program from which F06ULF is called.  
*Constraint:*  $LDAB \geq K + 1$ .
- 8: WORK(\*) – **double precision** array *Workspace*  
**Note:** the dimension of the array WORK must be at least  $\max(1, N)$  if NORM = 'I' and at least 1 otherwise.

## 6 Error Indicators and Warnings

None.

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