

# NAG Library Routine Document

## F06UDF

**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

F06UDF 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  $n$  Hermitian matrix, stored in packed form.

### 2 Specification

```
FUNCTION F06UDF (NORM, UPLO, N, AP, WORK)
REAL (KIND=nag_wp) F06UDF
INTEGER                N
REAL (KIND=nag_wp)    WORK(*)
COMPLEX (KIND=nag_wp) AP(*)
CHARACTER(1)          NORM, UPLO
```

### 3 Description

None.

### 4 References

None.

### 5 Parameters

- 1: NORM – CHARACTER(1) *Input*
- On entry:* specifies the value to be returned.
- NORM = '1' or 'O'  
The 1-norm.
- NORM = 'I'  
The  $\infty$ -norm (= the 1-norm for a Hermitian matrix).
- NORM = 'F' or 'E'  
The Frobenius (or Euclidean) norm.
- 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 the upper or lower triangular part of  $A$  is stored.
- UPLO = 'U'  
The upper triangular part of  $A$  is stored.
- UPLO = 'L'  
The lower triangular part of  $A$  is stored.
- Constraint:* UPLO = 'U' or 'L'.

- 3: N – INTEGER *Input*  
*On entry:*  $n$ , the order of the matrix  $A$ .  
 When  $N = 0$ , F06UDF returns zero.  
*Constraint:*  $N \geq 0$ .
- 4: AP(\*) – COMPLEX (KIND=nag\_wp) array *Input*  
**Note:** the dimension of the array AP must be at least  $N \times (N + 1)/2$ .  
*On entry:* the  $n$  by  $n$  Hermitian matrix  $A$ , packed by columns.  
 More precisely,  
     if UPLO = 'U', the upper triangle of  $A$  must be stored with element  $A_{ij}$  in  
     AP( $i + j(j - 1)/2$ ) for  $i \leq j$ ;  
     if UPLO = 'L', the lower triangle of  $A$  must be stored with element  $A_{ij}$  in  
     AP( $i + (2n - j)(j - 1)/2$ ) for  $i \geq j$ .
- 5: WORK(\*) – REAL (KIND=nag\_wp) array *Workspace*  
**Note:** the dimension of the array WORK must be at least  $\max(1, N)$  if NORM = '1', 'O' or 'I', and  
 at least 1 otherwise.

## 6 Error Indicators and Warnings

None.

## 7 Accuracy

Not applicable.

## 8 Parallelism and Performance

Not applicable.

## 9 Further Comments

None.

## 10 Example

None.

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