

USRA

Unsigned Shift Right and Accumulate (immediate). This instruction reads each vector element in the source SIMD&FP register, right shifts each result by an immediate value, and accumulates the final results with the vector elements of the destination SIMD&FP register. All the values in this instruction are unsigned integer values. The results are truncated. For rounded results, see [URSRA](#).

Depending on the settings in the [CPACR_EL1](#), [CPTR_EL2](#), and [CPTR_EL3](#) registers, and the current Security state and Exception level, an attempt to execute the instruction might be trapped.

It has encodings from 2 classes: [Scalar](#) and [Vector](#)

Scalar

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0										
0		1		1		1		1		1		1		0		!= 0000				immb		0		0		0		1		0		1		Rn				Rd			
U								immh								o1o0																									

USRA [<V><d>](#), [<V><n>](#), [#<shift>](#)

```
integer d = UInt(Rd);
integer n = UInt(Rn);

if immh<3> != '1' then UNDEFINED;
constant integer esize = 8 << 3;
constant integer datasize = esize;
integer elements = 1;

integer shift = (esize * 2) - UInt(immh:immb);
boolean unsigned = (U == '1');
boolean round = (o1 == '1');
boolean accumulate = (o0 == '1');
```

Vector

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Q	1	0	1	1	1	1	0	!	=	0000	immb	0	0	0	1	0	1	Rn				Rd								
U								immh				o1o0																			

USRA [<Vd>.<T>](#), [<Vn>.<T>](#), [#<shift>](#)

```
integer d = UInt(Rd);
integer n = UInt(Rn);

if immh == '0000' then SEE(asimdimm);
if immh<3>:Q == '10' then UNDEFINED;
constant integer esize = 8 << HighestSetBit(immh);
constant integer datasize = 64 << UInt(Q);
integer elements = datasize DIV esize;
```

```
integer shift = (esize * 2) - UInt(immh:immb);
boolean unsigned = (U == '1');
boolean round = (o1 == '1');
boolean accumulate = (o0 == '1');
```

Assembler Symbols

<V>

Is a width specifier, encoded in “immh”:

immh	<V>
0xxx	RESERVED
1xxx	D

<d>

Is the number of the SIMD&FP destination register, in the “Rd” field.

<n>

Is the number of the first SIMD&FP source register, encoded in the “Rn” field.

<Vd>

Is the name of the SIMD&FP destination register, encoded in the “Rd” field.

<T>

Is an arrangement specifier, encoded in “immh:Q”:

immh	Q	<T>
0000	x	SEE Advanced SIMD modified immediate
0001	0	8B
0001	1	16B
001x	0	4H
001x	1	8H
01xx	0	2S
01xx	1	4S
1xxx	0	RESERVED
1xxx	1	2D

<Vn>

Is the name of the SIMD&FP source register, encoded in the “Rn” field.

<shift>

For the scalar variant: is the right shift amount, in the range 1 to 64, encoded in “immh:immb”:

immh	<shift>
0xxx	RESERVED
1xxx	(128-UInt(immh:immb))

For the vector variant: is the right shift amount, in the range 1 to the element width in bits, encoded in “immh:immb”:

immh	<shift>
0000	SEE Advanced SIMD modified immediate
0001	(16-UInt (immh:immb))
001x	(32-UInt (immh:immb))
01xx	(64-UInt (immh:immb))
1xxx	(128-UInt (immh:immb))

Operation

```
CheckFPAdvSIMDEnabled64() ;
bits(datasize) operand = V[n, datasize];
bits(datasize) operand2;
bits(datasize) result;
integer element;

operand2 = if accumulate then V[d, datasize] else Zeros(datasize);
for e = 0 to elements-1
    element = RShr(Int(Elem[operand, e, esize], unsigned), shift, round
    Elem[result, e, esize] = Elem[operand2, e, esize] + element<esize-1
V[d, datasize] = result;
```

Operational information

If PSTATE.DIT is 1:

- The execution time of this instruction is independent of:
 - The values of the data supplied in any of its registers.
 - The values of the NZCV flags.
- The response of this instruction to asynchronous exceptions does not vary based on:
 - The values of the data supplied in any of its registers.
 - The values of the NZCV flags.

Base Instructions	SIMD&FP Instructions	SVE Instructions	SME Instructions	Index by Encoding	Sh Pseu
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