

SHL

Shift Left (immediate). This instruction reads each value from a vector, left shifts each result by an immediate value, writes the final result to a vector, and writes the vector to the destination SIMD&FP register.

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	0	1	1	1	1	1	0	!= 0000				immb		0	1	0	1	0	1	Rn				Rd						
immh																															

SHL [<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 = UInt(immh:immb) - esize;
```

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	0	0	1	1	1	1	0	!= 0000				immb		0	1	0	1	0	1	Rn				Rd						
immh																															

SHL [<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 = UInt(immh:immb) - esize;
```

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 left shift amount, in the range 0 to 63, encoded in "immh:immb":

immh	<shift>
0xxx	RESERVED
1xxx	(UInt (immh:immb) - 64)

For the vector variant: is the left shift amount, in the range 0 to the element width in bits minus 1, encoded in “immh:immb”:

immh	<shift>
0000	SEE Advanced SIMD modified immediate
0001	(UInt (immh:immb)-8)
001x	(UInt (immh:immb)-16)
01xx	(UInt (immh:immb)-32)
1xxx	(UInt (immh:immb)-64)

Operation

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

for e = 0 to elements-1
    Elem[result, e, esize] = LSL(Elem[operand, e, esize], shift);
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 Pseudocode
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