

**NAME**

ECDSA\_size, ECDSA\_sign, ECDSA\_do\_sign, ECDSA\_verify, ECDSA\_do\_verify, ECDSA\_sign\_setup, ECDSA\_sign\_ex, ECDSA\_do\_sign\_ex - deprecated low-level elliptic curve digital signature algorithm (ECDSA) functions

**SYNOPSIS**

```
#include <openssl/ecdsa.h>
```

The following functions have been deprecated since OpenSSL 3.0, and can be hidden entirely by defining **OPENSSL\_API\_COMPAT** with a suitable version value, see **openssl\_user\_macros(7)**:

```
int ECDSA_size(const EC_KEY *eckey);
```

```
int ECDSA_sign(int type, const unsigned char *dgst, int dgstlen,
               unsigned char *sig, unsigned int *siglen, EC_KEY *eckey);
ECDSA_SIG *ECDSA_do_sign(const unsigned char *dgst, int dgst_len,
                          EC_KEY *eckey);
```

```
int ECDSA_verify(int type, const unsigned char *dgst, int dgstlen,
                 const unsigned char *sig, int siglen, EC_KEY *eckey);
int ECDSA_do_verify(const unsigned char *dgst, int dgst_len,
                    const ECDSA_SIG *sig, EC_KEY *eckey);
```

```
ECDSA_SIG *ECDSA_do_sign_ex(const unsigned char *dgst, int dgstlen,
                             const BIGNUM *kinv, const BIGNUM *rp,
                             EC_KEY *eckey);
```

```
int ECDSA_sign_setup(EC_KEY *eckey, BN_CTX *ctx, BIGNUM **kinv, BIGNUM **rp);
int ECDSA_sign_ex(int type, const unsigned char *dgst, int dgstlen,
                  unsigned char *sig, unsigned int *siglen,
                  const BIGNUM *kinv, const BIGNUM *rp, EC_KEY *eckey);
```

**DESCRIPTION**

See **ECDSA\_SIG\_new(3)** for a description of the **ECDSA\_SIG** object.

See **i2d\_ECDSA\_SIG(3)** and **d2i\_ECDSA\_SIG(3)** for information about encoding and decoding ECDSA signatures to/from DER.

All of the functions described below are deprecated. Applications should use the higher level **EVP** interface such as **EVP\_DigestSignInit(3)** or **EVP\_DigestVerifyInit(3)** instead.

**ECDSA\_size()** returns the maximum length of a DER encoded ECDSA signature created with the private EC key *ekey*. To obtain the actual signature size use **EVP\_PKEY\_sign(3)** with a NULL *sig* parameter.

**ECDSA\_sign()** computes a digital signature of the *dgstlen* bytes hash value *dgst* using the private EC key *ekey*. The DER encoded signatures is stored in *sig* and its length is returned in *sig\_len*. Note: *sig* must point to **ECDSA\_size(ekey)** bytes of memory. The parameter *type* is currently ignored.

**ECDSA\_sign()** is wrapper function for **ECDSA\_sign\_ex()** with *kinv* and *rp* set to NULL.

**ECDSA\_do\_sign()** is similar to **ECDSA\_sign()** except the signature is returned as a newly allocated **ECDSA\_SIG** structure (or NULL on error). **ECDSA\_do\_sign()** is a wrapper function for **ECDSA\_do\_sign\_ex()** with *kinv* and *rp* set to NULL.

**ECDSA\_verify()** verifies that the signature in *sig* of size *siglen* is a valid ECDSA signature of the hash value *dgst* of size *dgstlen* using the public key *ekey*. The parameter *type* is ignored.

**ECDSA\_do\_verify()** is similar to **ECDSA\_verify()** except the signature is presented in the form of a pointer to an **ECDSA\_SIG** structure.

The remaining functions utilise the internal *kinv* and *r* values used during signature computation. Most applications will never need to call these and some external ECDSA ENGINE implementations may not support them at all if either *kinv* or *r* is not NULL.

**ECDSA\_sign\_setup()** may be used to precompute parts of the signing operation. *ekey* is the private EC key and *ctx* is a pointer to **BN\_CTX** structure (or NULL). The precomputed values or returned in *kinv* and *rp* and can be used in a later call to **ECDSA\_sign\_ex()** or **ECDSA\_do\_sign\_ex()**.

**ECDSA\_sign\_ex()** computes a digital signature of the *dgstlen* bytes hash value *dgst* using the private EC key *ekey* and the optional pre-computed values *kinv* and *rp*. The DER encoded signature is stored in *sig* and its length is returned in *sig\_len*. Note: *sig* must point to **ECDSA\_size(ekey)** bytes of memory. The parameter *type* is ignored.

**ECDSA\_do\_sign\_ex()** is similar to **ECDSA\_sign\_ex()** except the signature is returned as a newly allocated **ECDSA\_SIG** structure (or NULL on error).

## RETURN VALUES

**ECDSA\_size()** returns the maximum length signature or 0 on error.

**ECDSA\_sign()**, **ECDSA\_sign\_ex()** and **ECDSA\_sign\_setup()** return 1 if successful or 0 on error.

**ECDSA\_do\_sign()** and **ECDSA\_do\_sign\_ex()** return a pointer to an allocated **ECDSA\_SIG** structure or NULL on error.

**ECDSA\_verify()** and **ECDSA\_do\_verify()** return 1 for a valid signature, 0 for an invalid signature and -1 on error. The error codes can be obtained by **ERR\_get\_error(3)**.

## EXAMPLES

Creating an ECDSA signature of a given SHA-256 hash value using the named curve prime256v1 (aka P-256). This example uses deprecated functionality. See "DESCRIPTION".

First step: create an EC\_KEY object (note: this part is **not** ECDSA specific)

```
int ret;
ECDSA_SIG *sig;
EC_KEY *eckey;

eckey = EC_KEY_new_by_curve_name(NID_X9_62_prime256v1);
if (eckey == NULL)
    /* error */
if (EC_KEY_generate_key(eckey) == 0)
    /* error */
```

Second step: compute the ECDSA signature of a SHA-256 hash value using **ECDSA\_do\_sign()**:

```
sig = ECDSA_do_sign(digest, 32, eckey);
if (sig == NULL)
    /* error */
```

or using **ECDSA\_sign()**:

```
unsigned char *buffer, *pp;
int buf_len;

buf_len = ECDSA_size(eckey);
buffer = OPENSSL_malloc(buf_len);
pp = buffer;
if (ECDSA_sign(0, dgst, dgstlen, pp, &buf_len, eckey) == 0)
    /* error */
```

Third step: verify the created ECDSA signature using **ECDSA\_do\_verify()**:

```
ret = ECDSA_do_verify(digest, 32, sig, eckey);
```

or using **ECDSA\_verify()**:

```
ret = ECDSA_verify(0, digest, 32, buffer, buf_len, eckey);
```

and finally evaluate the return value:

```
if (ret == 1)
    /* signature ok */
else if (ret == 0)
    /* incorrect signature */
else
    /* error */
```

## CONFORMING TO

ANSI X9.62, US Federal Information Processing Standard FIPS186-2 (Digital Signature Standard, DSS)

## SEE ALSO

**EC\_KEY\_new(3)**, **EVP\_DigestSignInit(3)**, **EVP\_DigestVerifyInit(3)**, **EVP\_PKEY\_sign(3)**  
**i2d\_ECDSA\_SIG(3)**, **d2i\_ECDSA\_SIG(3)**

## HISTORY

All functionality described here was deprecated in OpenSSL 3.0.

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